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INSTRUCTION IN ELECTRIC WIRING.

The supply of trained workers is essential to the continued progress of every industry and for this reason educational methods never cease to be important. Nowhere is this more evident than in the electrical field, the rapid growth of which is so encouraging to young men who enter its ranks. Each new improvement, however, makes it more important than ever that the ambitious worker shall have the right sort of training as a foundation for his practice. The electrical trade as well as the professional aspects of the industry today requires a much wider knowledge of material and of apparatus than it did a few years ago; and the rules governing the installation of electrical equipment are becoming more strict and rigid. This increase in requirements is certain to continue, and will offer better and better opportunities to the well trained man.

It is a good sign that courses are now being given in a number of trade schools in distinct electrical specialties. For example, electric wiring is a branch of the industry in which first-class helpers, to say nothing of journeymen, are often very difficult to obtain. Here is a trade in touch with some of the greatest developments of modern civilization, an occupation in which skilled, intelligent work commands an excellent compensation and not seldom leads to an independent future. In none of the skilled trades at the present time is there greater need of thorough training, and the young man lacking this is likely to remain an ill paid and mediocre mechanic. Practical experience alone is not sufficient; a thorough knowledge of the fundamental scientific principles upon which the work depends being a necessity.

Instruction in electric wiring is today given in a great number of trade schools, but the extent of the courses naturally varies widely. Pittsburgh, New York, Boston, and other cities offer facilities of this kind which need not be compared here and which aim to produce better workmen without overlooking either the theoretical or practical sides of the craft. One of the most comprehensive of these courses, that of the Wentworth Institute, at Boston, is of particular interest on account of its adjustment to meet the dual needs of the day student and of the evening-school pupil who is obliged to obtain his instruction after putting in eight hours or so of work in the industrial field. In endeavoring to meet these requirements it is apparent that the instruction given the latter class of pupils must be somewhat less broad than that offered the former, but the general objects of the curriculum are similar.

The instruction in the more extended course, which occupies about nine months, includes shop practice in wiring, splicing, and making of various types of connections, electrical construction, the installation and operation of various types of apparatus and fixtures, study of wiring layouts, electrical diagrams, drafting, simple mathematics, electrical computations based on Ohm's law, the use of wire tables, estimating, and the study of electrical principles, with recitations and laboratory practice. The National Electrical Code and its applications obviously receive major consideration, and practical talks on principles and trade methods are features of deserved popularity. It is certain that the familiarity of the student with the actual handling of wire, fittings and apparatus is greatly increased by this sort of education, which gives the apprentice, the helper and the inexperienced man alike concrete opportunities to make up joints, determine wire sizes for given layouts, study the best methods of making cross-overs, branches and junctions, handling conduit, putting in special circuits and making up apparatus connections. Wisely it is committed to the instructors to make sure that the pupil sees not only *how* but *why* each operation is performed, so that when he gets into commercial work he can more easily adapt himself to changing conditions. Working layouts actually connected with a live circuit supplement the textbook and diagrammatic instruction, and the results are already being felt in the trade. No one institution can have a monopoly of this good work, and we look to see these methods of teaching one of the most important of the trades widely extended in cities where as yet only a fragmentary instruction in wiring is available. In the conditions of everyday work it is often very hard for the apprentice or helper to acquire a broad knowledge of his craft, and the efforts of the trade schools to supply better trained men deserve the widest encouragement.

FILLING THE NOON VALLEY.

The sharp drop in many central-station load curves during the noon hour—a rather elastic period—deserves more attention from the new-business department than it has received in the past. In too many plants this slump in output is taken too much as a matter of course. The load may fall off nearly two-thirds between 11:30 a. m. and 1 p. m. in some cities, and in a recent case investigated the company lost 4,300 kilowatt-hours during this period on a single day, representing a reduction of income of about $130 at the three-cent rate. This meant a loss in revenue of $39,000 a year in just one city, omitting Sundays and holidays. We make no apology for referring to this matter a second time in these columns, and venture the suggestion that conditions were never more propitious for at least partially compensating for this lull through the extension of electric cooking and heating service in the lunch-hour period. Electric heating appliances have been much improved in the past two or three years and rates have been more wisely adjusted to enable their commercial and residential use.

MAKING THE MOST OF DISPLAY LIGHTING.

Opportunities often may be found to improve display lighting without undue expense. Electric signs and outline illumination have come into use so fast that it is not surprising that efficiency of service has now and then been given insufficient attention. A group of installations examined in three cities illustrate this point. In one case a trademark about 10 feet square was mounted on top of a large laundry in full view of an electric railway trunk line. The emblem was painted on an excellent background in colors, but the illumination was provided by a border of carbon incandescent lamps forming an oval frame around the picture. Unfortunately no reflectors were put in, and although the sign has been in use several years, it has never been possible at night to clearly make out the picture represented, the glare from the unshaded lamps without any specific flux direction neutralizing the emblem most effectively. The substitution of tungsten lamps in such a case is the obvious move in the direction of economy of operation, but proper screening of the lamps and the reflection of their light upon the subject of the display is even more important from the standpoint of that maximum advertising efficiency without which the benefits of such electric service cannot be fully realized.

In the second instance the voting list in front of the city hall was posted on a bulletin board about 50 feet long and 2 feet wide, and at intervals of three feet 50-watt carbon lamps were hung directly in front of the listed names. The installation broke about all the commandments of illuminating engineering, and far better results could have been attained by placing 25-watt or perhaps even 15-watt tungsten lamps in a home-made tin reflecting trough at the top of the board, in which case every name could have been picked off at ease and no distraction would have been caused by bare lamps, which were a serious annoyance to the readers, hundreds of whom paused in front of the bulletin each evening.

A near-by church realized the importance of shielding the eyes of pedestrians from the direct rays of a service-announcement sign lamp, and the contrast was striking, if not novel.

In the third city visited, a small church in a dimly lighted residential section undertook to display its announcements by a bulletin board about 3 feet square, in the corners of which were concealed four 15-watt lamps symmetrically disposed. An increase in the number of lamps would have given better results, as the field of illumination was spotty through either an inadequate total luminous flux or too great a separation between the units in the hidden border. The critical study of such installations will in many cases lead to betterments which raise the standard of illumination and yield large satisfaction to the user.

THE ELECTRIC VEHICLE CONVENTION.

It may be said, without fear of contradiction, that the fifth annual convention of the Electric Vehicle Association of America, held in Philadelphia last week, marks a new epoch in the history, not only of the Association, but of electric-vehicle development as well. In attendance, character of papers presented, and general business accomplished, the convention surpassed that of any other meeting of the organization; but the point which is most gratifying to those interested in the development of the electric vehicle was the indication on every hand of closer co-operation between manufacturers and central stations.

The most spirited discussion during the meetings related to the much quoted prophecy that an extremely low-priced electric passenger car would soon be available, and while in general the manufacturers and central stations took opposite sides in this controversy, the discussion was aimed to bring out the actual truth in the matter, rather than being indicative of an antagonistic spirit. The manufacturers, almost as a unit, claimed that the car which they are at present manufacturing has not been selected because of their preference to producing such a vehicle, or because of any unusual profits accruing from its sale, but simply to meet public demand. They state that cheap electric passenger cars have been manufactured and without exception have proved a failure, and while the tendency of the gasoline-passenger-car industry has been to reduce cost, size of car, power, etc., the tendency in electric-vehicle manufacture has been directly the opposite.

The central-station interests, on the other hand, seemed to feel that there was a demand for a low-priced passenger car of reasonable battery capacity, and if such car were available, central-station companies would use them in large numbers. However, they agreed that the manufacturers best understood manufacturing conditions, and that while no one could definitely predict the future trend of passenger-car development, it was incumbent on all interested in the development of the electric to advocate and sell the cars that are at present available.

It would be difficult to single out any one paper of the many presented during the convention, as many were of a high character, and served to illustrate the developments that are being made. The report of the Parcel Post Committee, presented by Mr. James H. McGraw, received particular attention, however, because it calls attention to an extremely profitable field for the employment of electric commercial vehicles, which until recently has been almost entirely neglected. Today, however, postmasters in the majority of cities are being acquainted with the merits of the electric vehicle, and it is safe to assume that this type will receive serious consideration in the future. This is a step in the right direction, and illustrates what may be accomplished by co-operation and Association work.

The progress reported by various committees as having been accomplished during the past year, is due in a large measure to the untiring efforts of Mr. Frank W. Smith, retiring president, who was one of the first of the central-station executives to realize the importance of the battery-charging load. In addition to Mr. Smith, much credit is due to the Philadelphia Section representatives, who worked long and faithfully to make the fifth annual convention the success that it was.

REGENERATIVE USE OF ELECTRIC VEHICLES.

A comparison of the energy consumptions and consequent operating costs of two vehicles, running respectively on level ground and on steep grades, shows how largely these elements depend upon the topography of the region. Since the radius of operation of an electric vehicle depends not only upon its battery capacity, but also upon the energy output per mile, this feature is also limited by the grades encountered. In a flat country more can be accomplished per charge than in a hilly country, other conditions being equal.

If a vehicle returns to its starting point at the end of the day's run, it is evident that all of the energy expended to lift it up the hills, and temporarily stored as potential energy, has been dissipated. Some use of this energy may have been made by coasting, thus sparing the battery from a drain on down grades; but if the hills are at all steep, but a small portion can be thus utilized, and the remainder is probably dissipated by braking.

The possibility of utilizing the energy stored in the vehicle after it has climbed to an elevation is one fraught with great potentialities, for if it could be carried out to the fullest extent, it would give the electromobile approximately the same radius of operation in a hilly country as in a flat one. While the regenerative principle, as applied to electrical apparatus, has been utilized in other directions, it may not at first sight seem promising, when the proposal is made to apply it in this connection. The wide variation in speed presents one difficulty, but the presence of a storage battery ready to absorb energy whenever appropriately applied makes the problem one whose solution is close at hand.

In a paper presented before the Electric Vehicle Association of America at its annual convention, held last week in Philadelphia and reported in this issue, Mr. T. H. Schoepf assures us that the cost is trivial and that the results are well worth while, and produces the records of test runs to prove it. It is shown that both the total mileage per charge and the average speed are increased perceptibly by regenerative coasting. While no practical scheme can return to the battery the entire excess of energy expended in climbing hills, any increase in performance which can be attained by simple modifications of equipment is well worth while. The application of this idea in hilly cities, such as Pittsburgh, San Francisco, Kansas City and Cincinnati, should add definitely to the serviceability of the electric vehicle.

Chicago Electric Vehicle Meeting.

At the luncheon of the Chicago Section, Electric Vehicle Association of America, held at the Hotel Sherman on October 27, John F. Gilchrist, who was elected president at the convention in Philadelphia last week, was present and spoke of the future of the electric vehicle and of the Association. He thought the electric would be the car of the future in an overwhelming number of instances, particularly if the central stations took the interest in the industry that its importance deserves. When the craze for joy riding has subsided and the road conditions and charging facilities improved, the electric vehicle will come into its own.

Impressions of the Philadelphia convention were recited by J. W. McDowell, chairman of the Chicago Section, G. A. Freeman, G. B. Frayer, and D. C. Arlington.

E. P. Chalfant, secretary of the Electric Vehicle Manufacturers' Association, spoke briefly relative to the field for co-operation between the two organizations. Speaking of the field for a low-priced passenger car, he thought that the greatest opportunity for the sale of such a car was to the utility companies who should design the car themselves, so that it would be universally adopted by all central stations, and also set a maximum price on the vehicle.

Henry Wardrop thought that information concerning electrics should be sent to the daily papers by the Association. He also advocated co-operation with the gasoline-vehicle manufacturers.

Jovian League Honors Edison.

An enthusiastic and well attended meeting of the Jovian Electrical League of Southern California was held at Christopher's, Los Angeles, Cal., October 21, more than 200 members and guests being present. A special program was prepared in commemoration of the thirty-fifth anniversary of the perfection of the incandescent lamp by Thomas A. Edison.

The chairman of the day was George A. Damon, who happily introduced the speakers: J. A. Lighthipe, of the Southern California Edison Company, spoke on "At the Very Beginning," giving reminiscences of his experience with Mr. Edison at the time when the incandescent lamp was first introduced and perfected. Professor J. N. Colkitt also related interesting facts of the new lamp.

William W. Copp, sales manager of the Edison Lamp Works, followed with a talk on the "Past, Present and Future of the Incandescent Lamp," with illustrations on lantern slides. Old and new lamps (including replica of the original lamp), and the Edison storage battery were exhibited by the courtesy of James F. Rogan. During the speaking a congratulatory telegram was read from Mr. Edison.

Music and entertainment for the inner man combined to make a very successful meeting of this progressive association, electrical men being present from all over the southern part of the state. At its close souvenirs were distributed and the following officers were elected unanimously: J. Harry Pieper, president; H. F. Anderson, vice-president; J. O. Case, secretary and treasurer; H. W. Allen and J. E. Wilson, directors.

Electric Club of Chicago.

At the meeting of the Electric Club of Chicago held on October 22, an illustrated address on "Chicago in Early Days" was made by Frank W. Smith, cashier of the Corn Exchange National Bank, Chicago. The address was full of historic and human interest. The various steps in the extraordinary growth of the city were narrated by the speaker. In 1803 the first white settler established himself on the site of the city. In 1844 its public school had but 30 to 40 pupils; now there are about 350,000 pupils in the city schools and the total population is about 2,500,000. A large number of views of the city in its early days, of notable buildings and of early settlers were shown.

Before Mr. Smith's address, Homer E. Niesz, newly elected Jupiter of the Jovian Order, was called on. He modestly gave the credit for his election to the Chicago Jovians and urged all the electrical men in the city to prepare early for the next Jovian congress, which will be held in Chicago next year and should be on a grander scale than any heretofore.

Utah Electric Club Discusses Interstate Commerce Commission.

The regular weekly luncheon of the Utah Electric Club was held at the Commercial Club, Thursday, October 22. W. H. Gregory, attorney for the Salt Lake Route, discussed the Interstate Commerce Commission and its relation to the railroads, outlying the history of the regulation of interstate commerce from the time of the 13 original colonies down to the present date. He assigned as one of the fundamental reasons for the adoption of the Constitution of the United States the necessity which the colonies felt of having a centrally organized government to deal with the multitudinous problems arising from intercolony commerce and intercourse, and showed how the Interstate Commerce Commission as we now have it was the outgrowth of the complex problems arising from the rapid development of the railroads during and since the latter half of the nineteenth century.

Electric Elevator Manufacturers Meet.

Thirty-one members of the Elevator Manufacturers Association, representing 23 of the leading electric and other elevator manufacturers of the country, met in Cincinnati, at the Hotel Gibson, last week, with President H. F. Gurney, of New York, presiding. One of the principal features of the meeting was the semi-annual banquet, at which the members were addressed by two Cincinnati men, Dean Herman Schneider, of the College of Engineering of the University of Cincinnati, and Robert R. Freer, a well known elevator man. Dean Schneider spoke on the system of co-operative technical education which has been developed at the University in his department, while Mr. Freer devoted his attention to cost accounting as a cure for indiscriminate price-cutting. New York was selected as the next meeting place of the organization. Those present were: A. B. See, H. F. Gurney, C. R. Callaway, W. L. O'Connell, N. O. Linstrom and J. I. Wakelee, of New York; Martin B. McLaughlin, of Boston; V. K. Ecker, of Louisville; E. E. Hollister, of Quincy, Ill.; A. E. Montgomery, of Moline, Ill.; H. B. Haughton, H. A. Bennett and I. N. Haughton, of Toledo; C. E. Ketchum, C. H. Hain and F. E. Hurlbert, of Warsaw; A. H. Norton, of Boston; A. S. Gray and J. H. Nevere, of Columbus; Frank Hecht, Jr., of Chicago; D. V. Reedy, of Indianapolis; George B. Kloop, of Philadelphia; George T. Marshall, of Pittsburgh; F. E. Turner, of Kansas City; Charles Reedy, Howard Ayres, E. N. Atkins, J. W. Atkins, F. N. Temple, O. F. Shepard, Jr., and Secretary C. H. M. Atkins, of Cincinnati.

Chicago Jovian League.

At the meeting of the Chicago Jovian League, held on October 26, plans for enhancing the value of the local luncheon meetings were discussed. Many suggestions were made for increasing the attendance, insuring the presence of speakers on instructive electrical and allied topics and stimulating interest in the broader work of the Jovian Order. Nominations for elective officers of the local league were made and will be voted on at the annual meeting to be held next Monday, November 2. Much other important business will be brought up then.

Employment Department of American Institute.

The American Institute of Electrical Engineers has established an Employment Department at the New York headquarters. Announcements of vacancies will be published in the *Proceedings*, or the office will furnish records of available men upon notification.

Columbus Jovians Have Rally.

There was unusual interest at a meeting of Columbus Jovians on Friday, October 23, the first since the annual congress at St. Louis, by reason of one of their members having been made a national official of the order. The recipient of this honor, Arthur E. Loeb, vice-president of the Avery-Loeb Electric Company, elected congressman for the fifth district, made a few remarks, thanking his fellow Jovians for the enthusiastic campaign they had waged in his behalf.

Vinton G. Eastman, the popular and efficient statesman for the past year, was formally succeeded by C. J. Metz, who, under the change in the constitution, will be known as First Tribune. Mr. Metz is wire chief of the Columbus branch of the Central Union Telephone Company, and one of the strong young men of the Order, who has done much to further its interests at Columbus. In W. G. Stierhoff, of the General Electric Company, who was made Second Tribune, he will have an able assistant.

A very active year has been mapped out. Luncheons will be held at the Virginia every two weeks, and these will be interspersed with evening gatherings of a more pretentious nature. Some time in January will be the rejuvenation, at which it is expected to initiate at least one hundred new members. Before leaving St. Louis, Mr. Metz secured a promise from Jupiter Homer E. Niesz, of Chicago, that he would attend this event. The exact date has been left open to suit his convenience.

Biweekly meetings are to have a serious as well as a social purpose. To this end an instructive talk from some electrical authority will be a feature. The first of these, the first week in November, will be by E. A. Reed, general manager of the Ohio division offices of the Central Union Telephone Company, on the subject of "Co-operation." Another speaker from the Bell organization is D. H. Morris, commercial manager at Columbus, who will be heard in the near future on "Telephone Systems in General." Various departments of the electric field are to be covered during the winter by authorities yet to be announced.

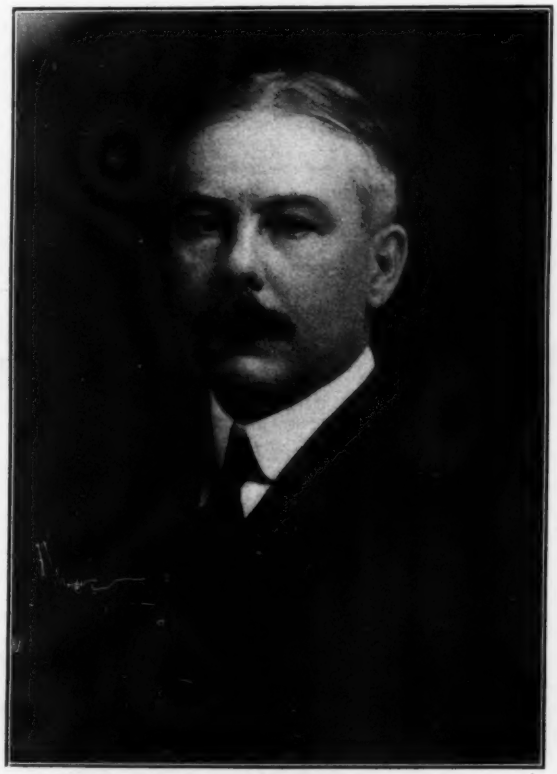
Wireless telegraphy is being used in Canada in reporting promptly and economically on forest fires.

H. H. Westinghouse.

At a recent meeting of the Board of Directors of the Westinghouse Air Brake Company, held at Wilmerding, Pa., Henry Herman Westinghouse was elected president to succeed his brother, the late George Westinghouse, founder of the Air Brake Company and numerous other Westinghouse industries.

H. H. Westinghouse was born at Central Bridge, Schoharie County, N. Y., in 1853. He attended the schools of Schenectady, and later entered Sibley College of Engineering at Cornell University, Ithaca, N. Y.

Mr. Westinghouse is married and lives in New York City, having a country residence at Kidders, N. Y.



H. H. Westinghouse,
President of the Westinghouse Air Brake Company.

Like his brother, Mr. Westinghouse inherited from his father a fondness for mechanics and invention. He invented the well-known high-speed, single-acting Westinghouse steam engine for the manufacture of which the Westinghouse Machine Company was organized in 1880. This is said to have been the only commercial steam engine invented by any of the Westinghouse family.

In 1873, George Westinghouse invited his younger brother to Pittsburgh to assist him in the management of the Air Brake Company, with which organization he has been connected ever since, for many years past being its first vice-president, and has been prominently identified with several other of the Westinghouse industries.

Mr. Westinghouse has always taken a great personal interest in the affairs of the Air Brake Company's employees, being an active member of the Veterans' Association of that company, and instrumental in the promotion of the welfare work and pension plan so successfully exploited by this company.

Mr. Westinghouse was also the organizer, and for a number of years the guiding spirit in the management, of the Westinghouse, Church, Kerr Company.

In his profession of mechanical engineer, Mr. Westinghouse ranks very high, his particular gift being the design of machinery, in which branch he is considered an expert.

He is quite unassuming and singularly democratic with the men in the shops and is known by practically all of the employees. He was a particularly intimate associate of his late brother and was his most faithful lieutenant in the management of his numerous affairs.

Boston Section, N. E. L. A. Annual Meeting.

The annual meeting of the Boston Edison Company Section of the National Electric Light Association occurred October 20, when the following officers for 1914-15 were elected: President, L. R. Wallis; first vice-president, L. L. Elden; second vice-president, C. E. Greenwood; secretary, J. J. Buckley; treasurer, C. H. Miles. Executive Committee, E. S. Mansfield and C. A. White, with the above.

Harry T. Edgar, of the Stone & Webster Management Association, Boston, gave an illustrated address on the Keokuk hydro-electric development, D. L. Galusha, of the Stone & Webster Engineering Corporation, illustrating Mr. Edgar's paper by means of lantern slides.

Mr. Wallis took charge and outlined plans for the year's work. Twelve new applicants for membership were received, and it is hoped and expected that the increment will be large during the year. The Section is open to all members of the Edison Company's organization, and also to central-station men, and workers in allied industries, in Greater Boston. About 200 were present at the meeting, which was held at the new Welfare Buildings.

The city of Toronto, Canada, is contemplating extensions to its electric street lighting and street-car-lines.

Council Meeting of Illuminating Engineering Society.

At the October meeting of the Council of the Illuminating Engineering Society the resignation of J. D. Israel, as secretary was accepted with regret and C. A. Littlefield was appointed general secretary. Mr. Israel was appointed a director in place of Mr. Littlefield. The resignation of V. R. Lansingh as director was accepted and a resolution adopted expressing appreciation of his services.

Committees were appointed for the current year, the following being named as chairmen: A. E. Kennelly, Nomenclature and Standards; L. B. Marks, Lighting Legislation; G. H. Stickney, Papers; P. G. Nutting, Glare; C. H. Sharp, Editing and Publication; M. C. Turpin, Advertising; P. S. Millar, Sustaining Membership; W. J. Serrill, Reciprocal Relations; O. H. Fogg, Exhibition Booth (Gas); Ward Harrison, Exhibition Booth (Electric); A. Hertz, Finance; D. McFarlan Moore, Membership; W. C. Morris, Board of Examiners.

Tait Declares Municipal Lighting Plants Unprofitable.

In an address delivered on the evening of October 20, President Frank M. Tait, of the Dayton Power and Light Company, which is vigorously opposing the plan for a municipal plant in that city, presented figures in support of his declaration that not a single municipal electric plant of any consequence has proven profitable, mentioning Cleveland, Columbus and Hamilton, O., and Fort Wayne, Ind., as examples. That is, making allowance for all fixed charges, such as investment, depreciation and sinking fund provisions, and for the loss of taxes to the city, he maintained that the city plants could not compare favorably with privately owned plants. The bond issue which is to provide funds for the municipal plant in Dayton will be voted on November 3.

Ohio Electric Light Meter Men Hold Conference.

The Meter Committee of the Ohio Electric Light Association, consisting of A. H. Bryan, Cleveland Electric Illuminating Company; John Himes, Dayton Power and Light Company; R. F. Allen, Columbus Railway, Power and Light Company; G. E. Snyder, Toledo Railway and Light Company, and R. Wolford, Ohio Light and Power Company, of Newark, met in Dayton, O., on Friday, October 23, the meeting being attended also by a large number of electric meter men in the southern part of Ohio, who were interested in the matters coming up before the committee. Papers were read by Mr. Lavell, of the Columbus Railway, Power and Light Company, on "Proper Method of Installing Electric Light and Power Meters," and by C. Garman, of the Dayton Power & Light Company, on "Up-to-Date Methods of Maintaining Electric Light and Power Meters," those present participating in a general discussion of the points raised. The meter department of the Dayton company was inspected, as it is considered one of the best in that section.

Pittsburgh Section, Illuminating Engineering Society.

The first regular meeting of the winter season of the Pittsburgh Section of the Illuminating Engineering Society was held in the rooms of the Engineers' Society, Friday evening, October 23. Papers presented at the Cleveland convention were abstracted as follows: "Artificial Daylight—Its Production and Use," by Professor L. O. Grondahl; "The Development of Daylight Glass," by Harold Kirschberg; "Self-Contained Portable Electric Miners' Lamps," by H. O. Swoboda; "The Locomotive Headlight," by J. L. Minick.

Kansas Gas, Water, Electric Light and Street Railway Association Elects Officers.

The seventeenth annual convention of the Kansas Gas, Water, Electric Light and Street Railway Association was held on October 22, 23 and 24, at the Fifth Avenue Hotel, Arkansas City, Kans. Officers were elected for the ensuing year as follows: President, H. W. McGruder, Liberal; first vice-president, W. R. Murrow, Independence; second vice-president, N. R. Waggoner, Salina; third vice-president, Otto Theis, Dodge City; secretary-treasurer, E. A. Wright, Manhattan.

Notable Telephone-Switchboard Patents Expire.

On October 26 there expired after a full life of 17 years one of the most notable groups of electrical patents ever issued by the United States Patent Office. On October 26, 1897, there were granted to Milo G. Kellogg, of Chicago, Ill., a total of 125 patents on multiple telephone switchboards and details thereof. These were taken over by the Kellogg Switchboard & Supply Company, of which Mr. Kellogg was the active head. This was the largest number of patents ever issued to an individual on a single day and created great interest in telephone circles of the time.

On November 4, 8:15 p. m., H. E. Hallborg, of the Marconi Wireless Telegraph Company of America, will present a paper on "Resonance Phenomena in the Low-Frequency Circuit" at Columbia University, New York.

Meeting of Lynn Section, American Institute of Electrical Engineers.

On October 21 Prof. Comfort A. Adams of the Graduate School of Engineering, Harvard University, delivered a lecture on "The Induction Generator" to a large gathering of earnest men. The meeting was presided over by William H. Pratt, the new chairman, and refreshments were served after the lecture. The third floor of the old office building, at 42 Center Street, has been converted into a lecture hall, and a fine series of semi-monthly meetings is in prospect by this section, which held the distinction last season of being the largest in the country.

The Value of Electric Railway Organizations.

W. J. Clark, of New York City, manager of the heavy traction department of the General Electric Company, addressed the first fall meeting of the New England Street Railway Club in Boston, October 22, on "The Value of Electric Railway Organization."

He considered the street railways of America superior to those of any other country, of efficient service value to the public and of remarkable soundness financially. These factors he held were arguments against the public acquisition of street railway properties in the United States.

Leading New England traction men present were: President John R. Graham, of the Bangor Railway and Electric Company; P. F. Sullivan, of the Bay State Street Railway Company, and E. C. Foster of the Manchester (N. H.) Traction, Light and Power Company.

Chicago Section, Illuminating Engineering Society.

The Chicago Section of the Illuminating Engineering Society held a luncheon meeting at the Grand Pacific Hotel, Chicago, on October 22.

Chairman W. A. Durgin outlined the work of the year and Vice-President F. A. Vaughn made a brief address.

Papers which had been presented at the Cleveland convention were then abstracted by A. O. Dicker, J. R. Cravath and M. G. Lloyd.

Relax Cable Restrictions.

The French Telegraph-Cable Company announced October 26 that registered cable addresses, if they were registered prior to July 1 last, will be accepted on cable messages to Great Britain, Ireland, Russia, Egypt, the British possessions, and Belgium, when communication is restored, as well as to France. Messages, however, must be signed with proper names.

Electricity in Soap Manufacturing.

Although steam is required in the manufacture of soap many plants have found it profitable to purchase energy from central-station companies. There is, however, a large field yet undeveloped and data are presented in this article that are intended to familiarize the central-station engineer with the conditions that will be encountered.

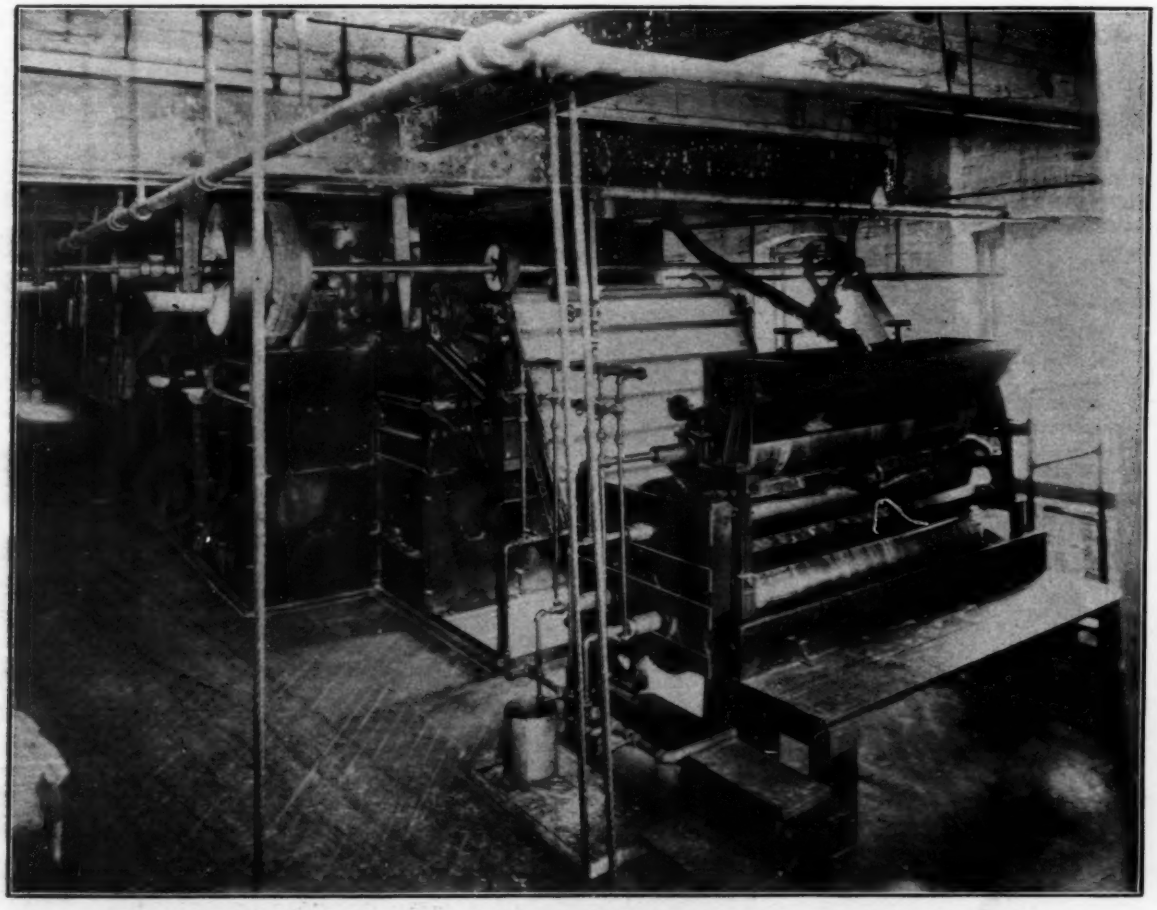
Steam in varying quantities is, of course, required in soap factories and for this reason there are many establishments that have adhered to the time-honored steam drive, in the belief that such operation was more economical than electric drive. That such contention is no longer sound is proven conclusively by the records from the rapidly increasing number of soap manufacturers not only using electric drive throughout, but purchasing all of the energy required from the local central-station company.

Data from several such plants have been presented in these columns on previous occasions. In our issue of July 12, 1913, complete operating data were given on four typical plants, of various size, all of which were purchasing power and realizing a saving over previous operating costs.

However, the saving which can be effected by the use of electricity for power purposes varies greatly with different plants and depends, of course, on the size and arrangement of the plant under consideration. A thorough canvass of the establishment should be made and the present, as well as the possible future conditions carefully weighed. Any comparison of economies should embrace not only the saving in fuel, but should also include the relative costs of repairs and maintenance. This is a strong point in favor of electric drive and should be given the importance it deserves when comparisons are being made.

Of the plants now employing mechanical transmission, the larger ones and those most complex or widely scattered would naturally derive the greatest benefit by adopting central-station power. In such establishments the transmission is usually more complicated, changing floor loads make it difficult to keep shafting in line, while developing conditions make frequent modifications and extensions to the transmission equipment necessary. To save time and expense these changes are often knowingly made not in a manner to get the most economical results, but in a way that will do for the time and avoid interruption to business. These conditions all increase the friction load of such a plant and serve to emphasize the economy of electric motor drive.

It is a common occurrence that not all of the departments of a soap factory are operated continuously or simultaneously. In fact in a number of plants visited it was found that never have all the machines or departments been operated at one time. This is par-



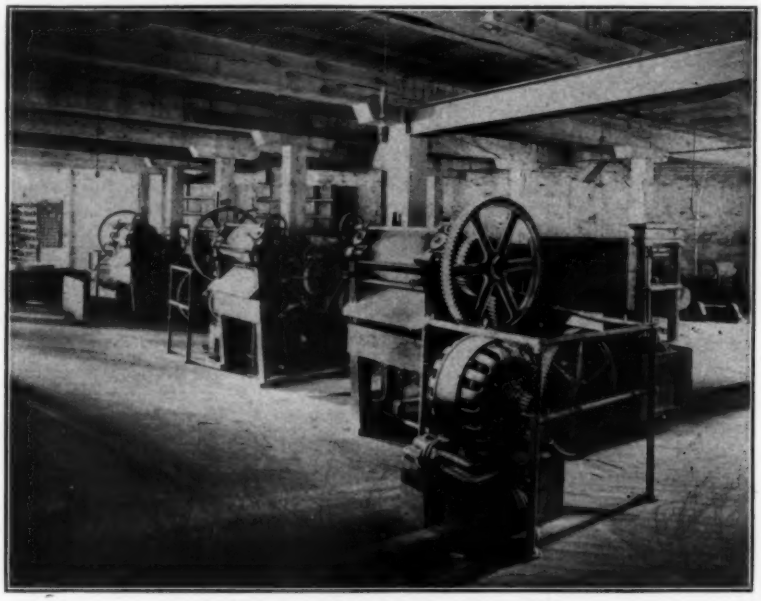
Proctor Soap Machine Driven by a 50-Horsepower Motor. Pennsylvania Soap Company, Lancaster, Pa.

ticularly true of the printing and box-making departments and of the soap-powder department. Therefore, in plants using mechanical drive it is necessary to operate the entire engine equipment if it is only desired to run one or two machines or departments. A carefully determined and suitable arrangement of electric motors permits any or all departments to be operated at will, without the loss due to operating needless transmission equipment.

In a prosperous concern some departments develop, perhaps even reaching such proportions that it may become necessary to relocate them. Another department shrinks or may be found to occupy space which could be used to better advantage for some other purpose. It is often found awkward to arrange anything like a good and economical plan for distributing power with shafting and belting, and departments are frequently, therefore, necessarily kept in awkward relations on this account, it being too expensive to relocate them.

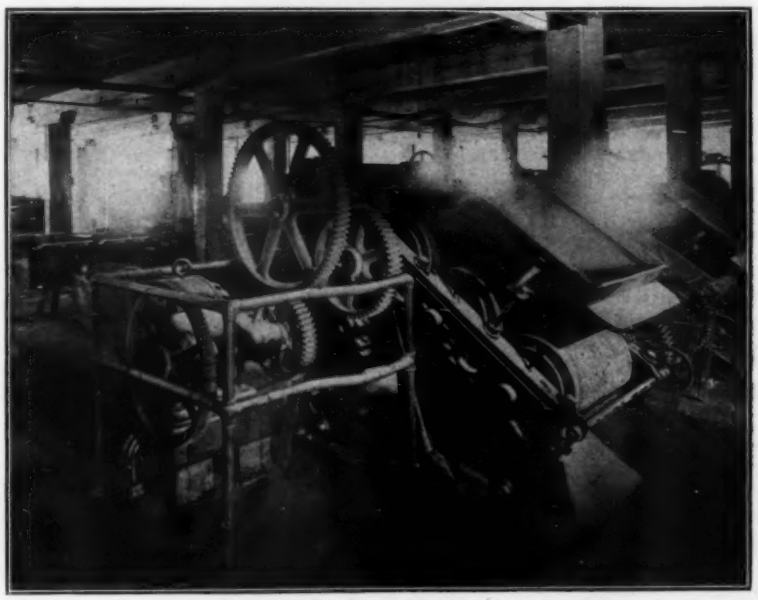
Also, the power plant is frequently a makeshift and the space so occupied could be used to good advantage for productive purposes. This is particularly true where the plant has to be located with particular reference to main lines of shafting.

A typical soap-manufacturing plant, which illustrates the advantages which accrue from electric motor drive, is that of the Pennsylvania Soap Company, at Lancaster, Pa. The Pennsylvania Soap Company does an annual business of approximately $200,000, employs 70 workmen, and operates nine hours per day. This plant was originally installed for electric drive and central-station service, so that it is impossible to compare the present operating costs with operation under steam drive. However, the management is enthusiastic over the results which are being attained, and having had experience previously with steam-operated installations, finds that the many theoretical advantages of the electric motor drive advanced by advocates of this system, are borne out in actual practice. One of the products of this company is soap powder, the demand for which is not co-incident, nor parallel, with that of the demand for toilet or laundry soaps manufactured. The powder department operates on a different schedule of hours than the other departments of the factory, and frequently over-time work is necessary, especially in filling packages. With this plant operated from a central engine, it would be necessary to employ an extra engineer and fireman, and operate the entire plant, simply to use the few machines in this one department. This also applies to a lesser degree in the box-manufacturing and printing department. In the latter, it frequently happens that outside work is taken in order to keep the employees busy, and an occasional rush job makes overtime work frequently desirable.



Group of Soap Mills Each Driven by an Individual Motor.

Because of the fact that the plant was designed originally with the view to using electric motor drive, and because no attention had to be paid to the matter of line shafting, etc., the building was laid out so as to perform the work with a minimum amount of handling and at the same time arrange the various machines so as to take the fullest advantage of natural light, ventilation, etc. In the basement, convenient to the packing department, is located the box-making machinery. Here a five-horsepower induction motor, operating at a speed of 1,120 revolutions per minute, is belted to a 20-foot, 5-hanger line shaft, and a 3-hanger, 12-foot countershaft driving one swing cut-off saw, one 16-inch ripsaw, and one Morgan No. 6 nailing machine.



Fire-Horsepower Motor Back-Geared to Soap Plodder, Pennsylvania Soap Company.

The machines in the printing and paper-box departments are driven from a 7.5-horsepower motor, running at a speed of 700 revolutions, through 60 feet of countershafting. The machines comprise one double scoring machine, one single scoring machine, two stay-

ing machines, two corner cutters, one paper cutter, and five small printing presses.

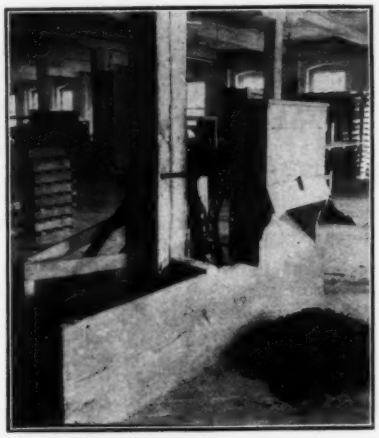
In the soap manufacturing proper, individual drive is employed to a considerable extent, and this has been found extremely satisfactory in this particular installation. A 15-horsepower motor, running at 1,120 revolutions per minute, is belted direct to a Proctor soap-drying machine, which handles the material as it comes from the cookers. On this same floor is also installed a two-horsepower motor, running at 1,700 revolutions per minute, which is belted direct to a soap chipper.

On the next floor are three five-horsepower motors, running at a speed of 670 revolutions, each geared direct to three Rutchman soap plodders. A view of these three machines is shown in one of the accompanying illustrations. Adjacent to this department are the soap mills, there being in all four of the Rutchman four-stone type, each geared to a 15-horsepower squirrel-cage induction motor, running at a speed of 850 revolutions per minute.

In another department two Rutchman crutchers are installed, two of two-ton capacity, and two of four-ton capacity, all being driven by a 20-horsepower induction motor operating at a speed of 1,120 revolutions per minute.

A 50-horsepower motor, operating at a speed of 850 revolutions per minute, operates the soap-powder department, the machines herein comprising one soap-powder mill and two package-sealing machines.

A five-horsepower motor on the top floor of the building is belted to a 24-foot, 6-hanger line shaft, driving one soap slaber, one Houchin & Aiken soap cutter, and one nailing machine.



Motor-Driven Soap Chipper.

In the basement a 15-horsepower motor is installed, running at a speed of 1,120 revolutions per minute, which drives three rotary soap pumps.

Among the miscellaneous motors installed, is a 7.5-horsepower, squirrel-cage induction machine, operating at 1,700 revolutions, which drives a barrel and box conveyor extending from the shipping room to the receiving department of the factory. Two five-horsepower motors are used to operate two two-ton freight elevators.

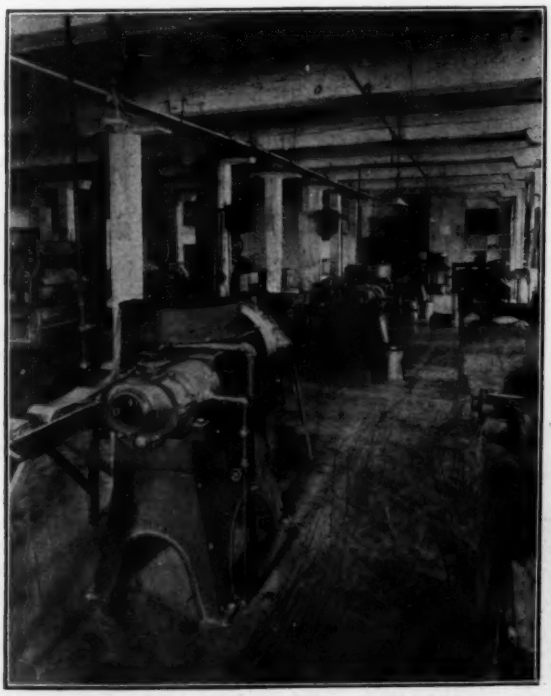
The monthly kilowatt-hour consumption of this plant during the past year has been as follows:

October	3436	April	3232
November	3590	May	2749
December	3559	June	2520
January	3540	July	2520
February	2200	August	2250
March	3471	September	2830

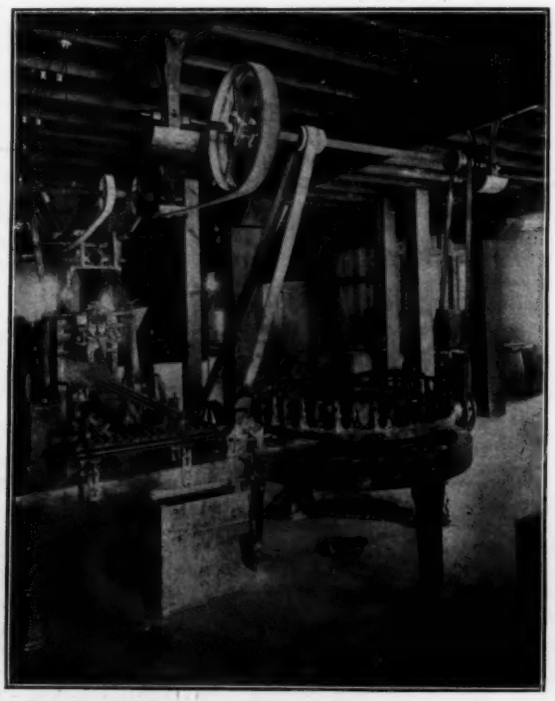
In regard to a soap factory which has previously used steam drive, and concerning which comparative cost data are available, attention is directed to our issue of July 12, 1913, which describes such an installation. The power equipment, under the old conditions, at this plant, comprised a 150-horsepower fire-tube boiler operating at 95 pounds pressure, for supplying steam for the soap vats, and a 12 by 30-inch, 50-horsepower, Corliss engine, running at 75 revolutions per minute. A 17-kilowatt, 250-volt, direct-current generator was installed to supply energy to two elevator motors located in the warehouse.

Power for driving the various machines in the factory was transmitted by an extensive system of belts and line shafts. The line shafting consisted of approximately 250 lineal feet, and was supported by 40 hangers. A series of tests conducted at this plant showed the friction load to be 12.63 indicated horsepower, while the average horsepower, during a day when all the machines were running normally, was shown to be 25.34 horsepower.

Tabulated costs, under steam operation, at this plant were shown to be as follows:



Soap Mills and Plodders Driven by Individual Motors.



Soap-Powder Machine and Package-Sealing Machine.

Coal, 270.48 tons @ $3.00	$ 811.38
Labor, one engineer and fireman	720.00
Cylinder oil, 1.5 pints per day	16.88
Engine oil, one quart per day	11.25
Waste, packing, etc.	25.00
Purchased power for lighting	523.49
Total	$2,108.00

The rates for electric energy, which the central station made to the factory, comprise a 6-cent charge per kilowatt-hour for the first 200 kilowatt-hours use during any month, 5 cents per kilowatt-hour for the second 200 units, 4 cents for the third 200, and 3 cents for all energy in excess of 600 kilowatt-hours used during any month. On each monthly bill a discount of five per cent is made on the first $25, and one per cent on amounts in excess of $25. These rates, applied to the consumption of the factory being considered, with the discounts given, made the average net cost per year for central-station power, $1,712.71. The annual saving in power costs exclusively is, therefore, $395.29. The factory, of course, took advantage of this opportunity to reduce operating expenses and installed an equipment of motors which cost $945. When the old equipment was disposed of, the total cash outlay for the new equipment amounted to $1,120.

Regarding the selection of motors for driving machines usually found in a soap manufacturing plant, no especial difficulties are encountered. Where alternating current is available, the polyphase induction motor with squirrel-cage windings has been found admirably suited, and is, of course, preferred. This motor is extremely simple and may, therefore, be built to withstand hard uses and to run continuously in such exposed locations as are usually found in a soap factory. In the case of soap-powder grinder, etc., the slip-ring motor should be specified, due to the heavy starting torque of these motors.

Where direct current only is available, it has been found preferable to use motors of the compound-wound type. In tank rooms, mixing rooms, and other locations where the motors would be subjected to dampness, acids, etc., it is found desirable to suspend them from the ceiling. In fact, this method of installation has become quite popular, because it has the advantage of economizing space.

Commercial Practice
Management, Rates, New Business

SELECTING MEN.[1]

By L. R. Moffitt.

Although we are accustomed to maintain extensive research and engineering staffs, write and observe lengthy specifications and exercise especial care in the selection of material, the selection of the men who are to develop, specify and use all materials is let entirely to the impression, whims and guess-work of the heterogeneous mass of employers.

In order that we may apply scientific principles to the selection of men, both the requirements of the job to be filled and the qualifications of the prospective incumbent must be known and compared.

Let us analyze the requirements for a simple job, that of station wireman. A man to qualify for this job should be of short height, for he has much stooping to do and such work that is above his reach would also be above the reach of a taller man. He should be of light weight, because in stooping and rising he will not tire so quickly. He should be quick and active, which further confirms our statement that he should be of light weight. That "large bodies move slowly" applies especially to men. He should be skillful with his fingers, since he handles small tools and supplies. His eyesight or perception should be keen for the same reason and in addition he must see to all details of tight connections, proper mica and carbon arrangement, correct sub-set connections, etc. He must be neat, because he is one of the first and last representatives of the company to come into personal touch with the subscriber. Also because his work must be sightly, and the completed job must be without soiled walls, dirty floors or disarranged furniture.

In the same manner the requirements for the following jobs can be determined.

Repairman: medium height and weight, physical activity, pleasant personality, keen perception, perseverance, loyalty, judgment, neatness, obedience.

Switchboardman: short height, light or medium weight, physical activity, digital skill, sure perception, neatness, accuracy, loyalty, orderliness, obedience.

Testboard-man: light or medium weight, orderly, nervous endurance, keen perception, initiative, judgment, pleasant personality, executive ability, courtesy, tact.

Head Lineman: tall or medium height, medium or heavy weight, cleanliness, orderly, strong arms and legs, sustained activity, manual skill, aggressiveness, responsibility, loyalty, initiative, executive ability, courtesy, tact.

Stockkeeper: short or medium height, medium or heavy weight, orderly, strong arms and back, muscular endurance, spasmodic activity, digital skill, good and sure perception, responsibility, carefulness, loyalty.

Wire Chief: medium height, light or medium weight, orderly, neat, decorous, pleasant personality, nervous endurance, physical activity, digital and manual skill, keen perception and hearing, aggressiveness, initiative, judgment, reliability, comprehension, cheerfulness, conscientiousness, tact, persistence, executive ability, loyalty, scientific ability.

Plant foreman: tall or medium height, medium weight, decorous, pleasant personality, muscular endurance, agility, sustained activity, manual skill, keen perception, aggressiveness, perseverance, initiative, judgment, reliability, comprehension, foresight, executive ability, justice, courtesy, loyalty, tact, conscientiousness.

Clerk: neatness, good respiration, digital skill, keen perception, obedience, accuracy, cheerfulness, conscientiousness, loyalty.

Stenographer: neatness, good respiration, strong arms and fingers, digital skill, constancy, keen and accurate perception, judgment, quick thought, loyalty, accuracy.

In most organizations there will be found more misfits than unfits. A misfit is the right man in the wrong job. To effect an economic and efficient organization certain adjustments must be made. The requirements for each job must be analyzed. A job may even be impossible, having two functions for which one man cannot possibly qualify. In such cases a more detailed analysis must be made of the functions and these rearranged to suit. For instance, a testboard man requires nervous endurance, while a record man requires patience and carefulness. It is frequently found that poor records in an exchange are the product of an exceptional and energetic testboard man.

1 With special reference to telephone work.

Having analyzed the jobs, let us now analyze each man in the organization with the object of placing him where he is best fitted. We must banish all prejudice for or against him. He must not be conscious of the examination or analysis.

The fundamental requirements of any employee are character, health, intelligence and industry. Without these, success for the employee and for the management is impossible. These terms are used in their broadest sense.

By character, we mean a man's honesty with himself, his moral courage, his aim in life and his methods and means of fulfilling that aim. No man can be successful without an aim of some kind and some method, if even haphazard, of attaining it.

The term health is usually granted to cover the physical state or condition. We must, however, in selecting men upon whom we are to place responsibilities, also look into their mental and moral health. Efficient men must have healthy thoughts and habits.

Though most men believe that thoughts are the result of circumstances or environment, quite the contrary is true, for this function of the mind is entirely subordinate to the will. That is, a man's thoughts may be governed by his own will or by that of another.

As an employer of men, your greatest duty to your employees is to cultivate healthy minds and habits. Beware of the man with either or all of the woman, wine and song proclivities. Man is naturally morally weak, and particularly so in the practical application of commercial morality.

By intelligence, we mean a man's mental capacity. It covers judgment, administrative ability and the ability to acquire knowledge. Intelligence should not be confused with education. We all have seen an educated mule at a circus. A "college man" is an ordinary man who has had nearly ideal conditions for acquiring knowledge. The actual acquisition is *up to* him, regardless of the course, school or teacher involved. Some of our most marked successes are men without college training, while some of our most flagrant failures are those who have had that opportunity.

Industry means a man's capacity for work. Among its sub-classifications are initiative, aggressiveness and ability to profitably employ time.

Without these four qualifications, no man is suitable for any job. Does the man being analyzed fulfill these requirements? If not, can he be strengthened or reclaimed? Next, what are his physical qualifications? Is he short or tall, light or heavy? Is he neat or slovenly? Is he skillful with his fingers, hands and feet, or is he awkward? Is his perception keen or dull, accurate or inaccurate? Is his hearing keen? Is he active? Orderly?

Next analyze his mental qualifications. Does he think logically, as indicated by his manner of presenting an argument? Does he think quickly? Does he possess initiative, as shown by doing the right thing without being told? Does he show good judgment in his private life? Has he perseverance as shown by not easily giving up a difficult task? Has he tact? Courtesy? Is he accurate? Does he possess executive ability, as shown by a strong positive personality?

From the following lists of qualifications, almost any man may be analyzed, or the requirements for any job selected.

Physical Requirements: tall, medium, short; heavy, medium, light; neatness, cleanliness, orderly; strong arms, hands, legs or back; muscular or nervous endurance; climbing or equilibrium agility; slow, quick, sustained, spasmodic, violent or gently active; digital, manual or pedal skill; quality of seeing, hearing, speech, feeling, smelling.

Mental Requirements: constancy, aggressiveness, perseverance, initiative, obedience, judgment, reliability, caution, quick thought, responsibility, calmness, patience, carefulness, accuracy, foresight, comprehension, executive and scientific abilities, justice, cheerfulness, courtesy, loyalty, conscientiousness, tact.

After selecting men, the next greatest ability in an employee is that of handling them. This ability consists of believing in yourself, your job and your co-workers, and knowing their job as well as your own.

Louisville Lighting Company Employees Meet.

What promises to be a most practical activity of the Louisville (Ky.) Gas & Electric Company, involving participation of all the members and employees of the company, has just been inaugurated. It means meetings for consideration of matters in which everybody should be interested and discussion of selected subjects at regular intervals. The first of these general meetings was called for Monday evening, October 26, and was held in a big basement room fitted up for the purpose in the company's office building. At this first meeting the matter of "Prompt Service Connections" was considered.

Discussion of the topic will center around a paper which has been in preparation for some time by a committee of six men who are in that department of the company, and who have been putting on paper a summary of their joint experiences and observations. Problems they have solved are being noted and suggestions which may occur to them will be made. The paper will be sent to the printers and copies of it will be distributed generally among the employees a day or so before the first meeting, so that all may be prepared to enter into the general discussion after it is read at the meeting.

One of the chief benefits to be derived from the series, it is pointed out, will be the direction of the employees' attention to ways of improving the service they are giving, where the company comes in contact with the public, and where operating problems, office management, etc., are concerned. Hearing first-hand from employees will present a large assortment of practical facts and suggestions from practical people before the whole body of employees and officials and should lead to general benefit.

The basement room where the sessions are to be held has just been prepared at the direction of Donald McDonald, vice-president and general manager of the company. It was used in part heretofore for meetings of the commercial department members, but newly painted and brightened up, with plenty of chairs and blackboards, etc., it will serve its purpose admirably.

Rate Reduction in Las Vegas.

The Las Vegas Light & Power Company, of Las Vegas, N. Mex., has made a reduction in rates. The new schedule is for 15 cents per kilowatt-hour for the first 30 hours' use per month of the active load; 10 cents per kilowatt-hour for the second 30 hours' use; 5 cents per kilowatt-hour for all additional. The active load is taken as 60 per cent of the connected load. These rates are for both commercial and residence customers. The monthly minimum is $1.00.

The old rates were 18, 16, 14 and 12 cents per kilowatt-hour.

This cut in prices would reduce the company's revenue about 20 per cent, if the consumption remained the same. Manager Southard, however, looks for an increase of 40 or 50 per cent in output.

Louisville Business.

Louisville Gas & Electric Company, for the week ended October 10, reported 219 new electric consumers secured, with 131 kilowatts of lighting, and 43 horsepower in motors. The Louisville Anzeiger Company has contracted with the company for current, thus closing down an isolated plant which supplied about forty customers.

Boston Edison Puts Sixteen-Watt Mazdas in Free Renewal List.

The Edison Electric Illuminating Company of Boston has added to its free renewal list 60-watt Mazda lamps and 750-watt nitrogen-filled Mazdas.

Electric Sign Data

Sign News of the Week.

If there is one season in which the electric sign is more effective than at any other period of the year, it is late autumn and winter. In northern latitudes darkness comes early in November, December and January, and to offset the effects of gloom and cold the observing, enterprising merchant uses plenty of light,—not merely enough to see his way about his shop, but in such volume as will display his goods, attract the pedestrian and make his place of business a landmark by night.

Electric signs are recognized as an ideal means of combining illumination with advertising. A sign that twinkles merrily, spelling forth in bright letters the name of its owner and the kind of merchandise to be found in his establishment, while at the same time it lights the street and pavement, will be sure to command attention.

The psychological result of light on the human is stronger at this season than it is perhaps at any other. It is natural to associate warmth and light. The cheerful glow in the windows of a store is a strong incentive to step inside and be comfortable. It would be absurd, of course, to say that this pleasant appearance alone would induce a sale to one who had no need for the merchant's wares, but grant the demand and it is fair to assert that the shop which is brightest has the best chance to supply the want.—*St. Louis Magazine.*

A new use for electric signs has been developed in Sandusky, O., R. H. Williams, of that city, having installed one 16 feet long announcing his candidacy for common-pleas judge. The sign is placed on a prominent business building, and is conspicuous enough to make it very useful for the purpose for which it is intended.

The Alhambra Theater, also of Sandusky, is having an electric sign installed in front of the theater which is the first of its kind to be erected in the city. The sign is 16 feet long and 10 feet high and shows the word "Alhambra" in permanent letters. Below the name of the theater are three panels each containing space for 10 letters, thus making it possible to announce the various attractions in letters of light. The sign is two-sided and can be seen from either direction.

Visitors in Toledo are impressed by the many and varied electric signs which adorn the streets at night and make the down-town streets as light as day. Recently outlining of buildings in electricity has taken hold of the fancy of Toledo merchants and many examples of this beautiful effect are now in course of construction. The new Priscilla Theater is thus adorned. The Empress Theater is the scene of the latest successful bit of outlining. Although this theater was provided with a large flashing sign, the entire three floors and all the windows were outlined in light and the whole surmounted by a huge butterfly in natural colors which folds its wings at will.

A hearing on a resolve of the last Legislature of Massachusetts that a commission, consisting of the chairman of the Gas and Electric Light and Public Service Commissions, the Tax Commissioner and the Attorney General consider the taxation of signs and draft a bill for taxing and regulating the same, was held in Boston, October 19. Proponents of the measure presented their arguments for restricting billboards and sky signs, and asked for a constitutional amendment which would enable the General Court to enact such legislation as would result in abating the objectionable display signs erected on private property. The regulation of electrically lighted signs comes within the scope of the proposed act. Sheldon E. Wardwell, representing electric lighting interests, registered opposition to the general terms of the measure. Counsel for the Bill Posters' Association argued that the mode of advertising under consideration formed a legitimate and valuable business, and was being improved with respect to its artistic features.

The hearing was continued to a date to be set, when further opposition will be voiced.

Two big electric signs, each containing 500 lamps, have been ordered by the Chicago, Milwaukee & St. Paul Railroad to be placed on top of the company's train sheds at Howard Street and at Washington Street, Spokane, Wash. The signs will face south toward the business center of the city. They are being made by a local concern, and will be installed by the Washington Water Power Company as soon as ready. That company is now installing the 38 arc lamps which will light the streets between Washington and Post under the tracks of the railways. Eight lamps will be installed at each viaduct, with the exception of Howard Street, where there will be ten of the lamps, and Post Street, where there will be only three of them.

Sign sketch contributed by the Greenwood Advertising Company, Knoxville, Tenn.

Sign is 13.5 feet by 5 feet and has raised block letters 14 to 24 inches high. There are 236 five-watt lamps used.

Background is glass smalt colored blue, with a green and gold border. Trade mark is of gray and gold.

Electrical Construction

SEATTLE'S CENTRAL FIRE-ALARM SYSTEM.

By Howard Joslyn.[1]

The designing of equipment for a central fire-alarm office should aim to meet the following principal requirements: reliability, which insures accuracy; speed of transmission of signals; economy of operation and maintenance.

It is not often given to the designer of such an office to have free swing in determining what will best answer the above requirements without being hampered to some extent by local conditions and being required to utilize some old equipment which has been worn in service.

The growth of Seattle in the past 15 years has been so rapid that the automatic six and twelve-circuit repeaters and switchboards purchased between 1898 and 1906 could not, with any reasonable additions, be expected to meet the needs of the service in the near future. The expansion of the city limits and topography of the territory included has been such as to readily encourage the use of one or more fire-alarm substations, in which the former automatic apparatus is and will be of advantage.

At present a large district lying north of the Lake Washington Canal is handled by a six-circuit automatic office which is some three miles distant and connected to the main office by a signal circuit. This substation equipment has reached the limit of its capacity and will soon be replaced by a twelve-circuit office of the same type. In a few years the southern district will be of sufficient size to require a substation located about the same distance from the main office in an opposite direction, and the six-circuit apparatus will then be used.

1 City electrician of Seattle, Wash.

Recording Registers in Left Foreground.—Protector Boards at Left.—Five-Circuit Puncturing Registers at Right.

After extended study of central-office equipment in other cities and discussion with engineers from the manufacturers of fire-alarm apparatus, it was decided to install a combined manual, semi-automatic and automatic office for 40 box, ten joker or register lines and ten gong circuits, with extra switchboard capacity to handle appliances local to the main office. The automatic method of operation was emphasized as the one to be generally used for transmission of incoming box alarms over the joker circuits; and the equipment was required to work with perfect non-interference on signals coming in at a speed of two taps per second.

Preference was given to the closed-circuit type of equipment throughout on account of the immediate evidence given thereby of any interruption of current. The saving in battery plant by using a common battery for open joker and gong circuits was found to be inconsiderable compared with cost of storage battery for individual closed circuits, when proper estimate is made of time required for frequent testing by operators, or money invested in automatic appliances, to determine condition of open circuits.

For receiving apparatus on box circuits the five-circuit puncturing register

Puncturing Registers in Left Foreground.—Combination Storage and Line Boards at Right and at Far End of Room.—Automatic Joker Transmitter in Deep Center.

was selected as a unit and nine of these instruments were purchased. In case of trouble with any such register it can be removed and quickly replaced by a spare instrument, spring contacts being used in the pedestal for all connections. In addition to the eight main registers, three single punching registers are used with automatic time and date stamps as recording instruments, one for all outgoing joker signals, one to act as master register for all signals from boxes, and one to record all outgoing signals on gong lines. Some consideration was given to the use of six registers of ten circuits each, but the present instruments were at least 30 per cent less in first cost and were adaptable to location more accessible to the operators.

Storage battery is furnished through seven 10-circuit combination storage and line switchboards with automatic control of the charging current; and the circuits are brought in through two protector switchboards containing 34 circuits each. On the boards each circuit is protected by a pair of line fuses, a pair of lightning arresters and a pair of circuit-breakers, all of which has been found to be very reliable, an audible signal being given automatically when one of the circuit-breakers opens.

The transmission switchboards consist of two 20-circuit main-line relay boards with visual and audible indicating equipment; one 10-circuit joker board carrying relays, pole changers, sounders, bells and light signals; and one 10-circuit gong board with ammeters for each circuit, bells, working switches and multiple key. All of the boards are equipped with single key for each circuit, with multiple gang switches for changing apparatus to manual or automatic operation by a single motion under control of the operator, and a gang switch is provided for reversal of polarity on joker lines to send the signals over them by manual transmitter. The working switches, instead of being mounted on separate boards, are all carried on the above switchboards almost directly in line with the instruments or apparatus which it may be necessary to temporarily cut out for repair or inspection. The switchboards are of slate, and all frames and cabinets are of metal finished in imitation of Circassian walnut. The bases of frames and pedestals are trimmed with white marble and the same material is used for running table around the switchboard frames and for the heavy slabs on top of cabinets.

An automatic transmitter equipment is provided for the ten joker circuits; and a three-dial manual transmitter is installed for transmission of signals over both joker and gong circuits. This manual transmitter is automatically wound, is equipped with both a right and a left main dial and an auxiliary dial with two speeds for fast and slow time, and has switches mounted on its base for connecting the instrument to any one or all of the joker and gong circuits. It can be used for the transmission of signals ranging from one to four figures each on either main dial, and when desired can transmit a preceeding signal of one round of one to four figures on the auxiliary dial. Each main dial is independent of the other so that while a signal is being transmitted from the right-hand dial a separate signal can be set up on the left-hand dial ready for immediate use, or vice versa.

Two separate P. B. X. telephone systems are provided for communication with engine houses, each station being equipped with instruments for the two circuits. One of these systems is used for transmission of alarms only, it being made possible by special key to talk to all the engine houses at once, thereby greatly facilitating the transmission of telephone fire calls and special orders. The other system is used for general communication. The grouping of apparatus for quickness of handling by the operator was particularly studied and his position in front of the telephone boards is conveniently located with reference to the manual transmitter and the transmission switchboards. Immediately at his right is located a pedestal carrying a multiple key for single or general operation of telegraph signal joker lines, and a telegraph key and telephone jack which can be plugged into any box, joker or gong circuit.

By turning in his place the operator can read the incoming signals on the puncturing registers and in the front panel of the pedestal carrying these registers are placed the individual and gang switches for throwing an incoming box signal automatically through the joker circuits when the office is set for manual operation, thereby saving the operator's time in making this change. The elimination of lost motion on part of the operator when handling an alarm has clearly shown the ability of one man to attend to the work and much more on his shift, but it is not considered advisable to leave him without assistance in case of trouble during the night watches. The saving effected by having only one operator during daylight hours represents the interest upon a large part of the cost of the office.

The central office and the engine houses are fully equipped for use of telegraph signals by key and sounder, but the telephone service has been found superior in all general communication except the reporting of apparatus returned to quarters. For communication between officers at a fire-alarm box and the central office the telegraph code is valuable. When the office is set for automatic operation any incoming fire-box signal will cause instant reversal of polarity on the joker lines and stop all communication by key and sounder.

The credit for manufacturing this equipment is due to the Gamewell Fire Alarm Telegraph Company, which was the successful bidder therefor; and it may be that improvement will be made in some particular appliance in the future, but for general efficiency and for quickness and economy of operation the entire central office has no equal.

Rhode Island Contractors' Convention.

The annual convention of the Rhode Island Electrical Contractors' Association was held October 20 at Providence. The convention opened with an afternoon session, President Walter Thurber in the chair. He outlined the motive of the convention pointing out the advantages of co-operation between members.

George W. Hill, special representative of the National Electrical Contractors' Association, read a paper by W. K. Tuohey, of Springfield, Mass., who was unavoidably detained, the subject being "The Contractors' Troubles and the Remedy."

Robert L. Brunet, public service engineer of Providence, discussed the development of the electrical business during the past 35 years. He stated that there is still a large latent field for the electrical man to occupy, there being but 20 per cent of the homes of Providence served with electricity.

E. R. Davenport, of the Narragansett Electric Lighting Company, spoke on "The Relation of the Central Station to the Contractor." He cited the experiences of his company in its dealings with the contractors of Providence and called attention to their friendly relations.

"The Electrical Contractor and Lighting Service" was discussed by E. P. Baker, of Providence, and "The Relation of the Jobber to the Contractor" was the subject of an address by Arthur K. Moody, of the Wetmore-Savage Company, of Boston, who spoke in place of Frank S. Price of the Pettingell-Andrews Company, of that city.

A. J. Hixon, of Boston, a director in the National Electrical Contractors' Association, spoke on "Legislation as it Affects the Contractor." The address was along the same general lines as that of Mr. Hixon before the New England contractors in Worcester, Mass., September 23-24, and reported in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of October 3. The speaker outlined the various and more or less divergent laws prevailing in the several states relative to regulating the functions of the electrician, particularly with respect to the matter of inside wiring. He urged the members to exert their efforts to further the enact-

ment of uniform legislation of benefit to the business in general.

A get-together meeting was held at 6 o'clock, and at 8 o'clock the members and guests partook of a dinner in the ball room of the Narragansett Hotel. Lieutenant-Governor Burchard, Mayors Gainor, of Providence, and Easter Brooks, of Pawtucket; Henry D. Temple, secretary of the Massachusetts Association; A. J. Hixon, of Boston; and Colonel A. H. Dyer, of Providence, were the speakers.

The public officials congratulated the association on its growth and helpfulness to the business. Messrs. Temple and Hixon brought the greetings of the Massachusetts and National associations, and Colonel Dyer recounted experiences in Europe at the outbreak of the war. Harry G. Lendrim was the toastmaster. Other guests, besides those mentioned, were E. W. Ham, Worcester, Mass.; J. P. Coughlin, of the Massachusetts association; E. W. Baldwin, Hartford, Conn.; and G. W. Hill, Utica, N. Y.

Iowa Electrical Contractors' Association.

The third semi-annual convention of the Iowa Electrical Contractors' Association was held at the Martin Hotel, Sioux City, Iowa, October 21 and 22. Twenty-five members were in attendance including W. H. Harper, Sioux City; M. T. Humphrey, Waterloo; G. W. Mathews, Jr., Sioux City; George O. May, Sioux City; E. A. Artz, Sioux City; E. A. Seabury, Omaha, Neb.; J. J. Owen, Missouri Valley; Charles E. Churchill, Battle Creek; Edmond Murphy, Sioux City; Floyd A. Wallace, Des Moines; F. B. Sabin, Des Moines; E. L. Snyder, Sioux City; L. W. Johnson, Pomeroy; Edward Kunkel, Davenport; H. C. Ryan, Sioux City; H. E. Jonear, Sioux City; H. B. Dunham, Sioux City. The visitors and salesmen were M. P. Ellis, Chicago; C. W. Chestnut, Omaha; E. S. Shortess, Ames; E. J. Hunt, Chicago; George V. W. Ingham, Chicago; D. E. Lauderback, Chicago; C. W. Kline, Sioux City; W. J. McFadden, Sioux City, and R. E. Young, St. Paul. The convention was opened by A. A. Smith, mayor of Sioux City. Owing to the inability of W. C. McCarten, of Marshalltown, president of the association, to be present, the response was made by Vice-President Floyd A. Wallace, of Des Moines. A helpful address respecting the relations that might exist between the contractor and the jobber was made by J. M. Bateman, sales manager of the Western Electric Company of Omaha, Neb. Other addresses were made by Edward Kunkel, of Davenport, on "Some Objections to Taking Wiring as a Sub-Contract;" by Israel Lovett, of Omaha, on "The Electrical Contractor and the Fixture Business;" by Floyd A. Wallace, of Des Moines, on "Cut-Throat Prices;" by J. B. Trenchard, manager, Fairbanks-Morse & Company, Sioux City, on "Farm Lighting;" by L. L. Kellogg, manager, Sioux City Gas & Electric Company, on "The Central Station and the Electrical Contractor." George B. Muldaur spoke upon behalf of the Society for Electrical Development.

Among the Contractors.

The W. G. Cornell Company, of Washington, D. C., has been awarded the contract for rewiring certain rooms in the State, War and Navy Department Building at their bid of $31,994. This installation called for wiring, fixtures, lamps and Doric reflectors of the Jefferson Glass Company manufacture.

The Electromechanical Company, of Baltimore, Md., has been awarded the electric installation in the State Normal School to be built at Towson, Md. This installation calls for a complete system of wiring, conduits, lighting and power feeders.

The partnership heretofore existing between William A. Green and Joseph R. Downs, electrical contractors of Peoria, Ill., and doing business under the firm name and style of Green & Downs, was dissolved on October 19, and terminated by mutual agreement. Joseph R. Downs has withdrawn from the firm. It is announced that William A. Green will pay all the debts of the partnership and collect all the accounts thereof.

The Electrical Contractors' Association of Maryland has held its first fall meeting after the usual summer vacation. President Dobler, after a welcoming address, showed many points of advantage to be gained through proper co-operation on the part of the individual contractors. The most important is the separation of electrical work from the general contract. Through this association the master heating and plumbing contractors have become interested and have drafted a letter to be sent to all architects, requesting that these ends of the building be treated in separate contracts. Quite a number of favorable replies have been received.

The business of the Beltzhoover Electric Company, Cincinnati, O., is increasing by leaps and bounds. Construction already finished this year shows a marked increase over the total business done last year. The following orders are booked for immediate attention:

Overhauling and repairing of the electric lighting and power system in the four-story building occupied by the Donaldson Art Sign Company.

Electric light wiring and telephone system in apartment building.

Alterations and additions to the lighting system and the installation of a stationary vacuum-cleaner system in a residence.

Installation of an interior telephone system in the plant of the E. Kahn & Sons Company, wiring to be lead-covered throughout.

Electric light wiring in the new garages for the J. & F. Schroth Packing Company and for Walter H. Field.

Wiring 12 small houses and apartments. This work will all be installed on the knob-and-tube system.

Arthur Bruen, who was formerly connected with the Electromechanical Company, of Baltimore, Md., has severed his connections with that firm and has associated himself with Samuel F. Gray. Mr. Gray is one of the pioneer electrical contractors of Baltimore.

The Blumenthal-Kahn Electric Company, Baltimore, Md., has received the contract for furnishing and installing the electric lighting fixtures in the new eight-story building for the Baltimore Bargain House Company. There are over 3,000 fixtures in this contract. The same firm also received the contract for installing the lighting and power feeders from the power house to the new building. Lead-incased cable will be used and will be of the Standard Underground Cable Company's manufacture.

The largest electrical contract of the year at Columbus, O., has been let to the Avery-Loeb Electric Company of that city. It amounts to practically $10,000, covering a $200,000 club house being erected by the Athletic Club, after plans by Richards, McCarty & Bulford, architects. The contract includes complete installation for wiring for electric lights, power, bells, time stamps and clocks, watchman service and fire-alarm service. Also of conduit for telephone service and all connections to motors and apparatus of various kinds. As part of the switchboard system, one panel is to be arranged to receive vacuum-heating-system gauges, refrigeration-machinery gauge, vacuum-cleaner gauge, compressed-air pressure gauge and other modern features. The specifications provide for a 220-110-volt, three-wire distributing system of direct current for lighting, with three-wire distribution to cabinet and two-wire circuits from cabinet. Distribution to motors and for power throughout are to be 220-volt, two-wire circuits. Lighting mains will have an aggregate capacity of 1,360 amperes, and power mains, 1,645 amperes. There will be about 1,500 electric light outlets. The building will contain every practicable electrical convenience.

LETTER TO THE EDITOR.

Planning a Lighting Installation.

To the Editor:

It seems that the technical side of artificial lighting is just beginning to receive the attention it should have had a long time ago by the users as well as those who supply it, but there seems to be a noticeable absence of a desire on the part of the manufacturers of shades and reflectors to supply the necessary data (or to encourage their use, except in a few cases) which will enable the average electrical contractor to go about the planning and installing of a lighting installation in a scientific way. This discussion does not contemplate the larger installations, where expert advice is usually sought by the architects in making the plans, but the smaller jobs, both new and remodeled, where the contractor is expected to act in the capacity of advisor as well as carry out the work, and in order to go about it intelligently he must have the necessary data at hand to enable him to carry out a certain scheme or to bring about a certain result. In order to figure on the proper use of any form of reflector or shade, the first thing we need to know is the characteristic curve of the distribution of light about these accessories; knowing this, one can obtain the intensity in foot-candles required for the installation in hand which is given by the tables and accepted as good practice as well adapted for the service intended. These tables are to be had in convenient form. As a general rule, reflectors are to be had of three general types, "diffusing," "distributing" and "focusing." The first two terms are somewhat confusing, as a distributing reflector is one which throws light in a downward direction and produces a uniform illumination over a comparatively large area; the diffusing type is supposed to allow quite a large percentage of light to be refracted through the glass to the ceiling and walls and thus diffuses or scatters the light in all directions; and the focusing reflector is really applicable in only a few cases, as it directs all the light in a downward direction and is thus useful only in cases where it is desired to light a high narrow space, and should only be used for such cases. As these reflectors are generally flat or very shallow they do not cover the source of light and lamps should always be placed as high as possible to keep them out of the range of vision. In fact, it is better to use a bowl type of reflector wherever it is possible, as it covers the source of light and is applicable in the majority of cases met with in practice. Most of the "white" glass reflectors on the mearket under the various trade names are lined with a thin lining of opal glass, which has a very high absorption. The idea of putting in a thin lining is to reduce this absorption to a minimum, but this lining causes a very large percentage of the light to be reflected and a smaller percentage to be refracted through the glass to the ceiling and walls, which suggests that the best results are to be obtained by hanging these reflectors fairly high, as they reflect most of the light in a downward direction.

There are many things to be considered in planning lighting for a building. The first thing should be the "fitness" of the fixtures; in fact the fixtures should be a secondary consideration (but unfortunately they are not, especially by the prospective owner) as they are but a means to an end and the primary object should be to produce illumination and not just give light; but the fixtures should so harmonize with the surroundings that they will look as though they were part of the interior in which they are placed and their presence should not be noticeable apart from any other part of the furnishings or architecture of the room; so the work of the architects in designing fixtures for a certain interior is to be commended for this reason, even if these fixtures do sometimes fail in the primary purpose for which they are intended, to furnish a suitable illumination.

It is a difficult matter to get an unbiased expression nowadays from designers or even users on the merits of direct, indirect or semi-indirect systems. In any case the illumination in a room should be balanced. There should be no deep shadows and no bright spots noticeable. While totally indirect seems to be the ideal lighting, we have not yet advanced to the point where we can go into a room lighted by an indirect system and not have the question involuntarily arise: where does the light come from? The advocates of this system have come to recognize the need of answering this question so far as to provide a means for allowing a small portion of light to come through some form of translucent glass in the form of a bowl or panels in the bottom of the indirect reflector. The direct system does not possess the advantages of the even distribution which results from the totally indirect, as the light sources are bound to be more or less noticeable. From this it would seem that the semi-indirect system is a happy medium, giving as it does the diffusion of the light refracted through the bowl, and the reflected light which comes from the ceiling, but unfortunately the loss of light by absorption of the glass and the fact that a translucent bowl is not nearly so efficient a reflector as the silvered surface of the totally indirect reflectors cause considerable loss in the reflected light. Consequently we can get a good general effect only by sacrificing efficiency, in the use of semi-indirect systems. As stated before, the absorption of the glass now on the market is very high, so that we do not get the light in a downward direction through the glass to make a proper balance with that light directed toward the ceiling; but great strides are being made in advancement in this direction and it is to be hoped that a glass will soon be produced which will give the desired results.

In the use of inverted dishes, etc., the same general rules as apply to open-bottom direct shades hold true; that is, a deep bowl directs the light over a fairly large area and can be hung fairly close to the ceiling, while a flat shape or shallow bowl is concentrating and should be hung a greater distance from the ceiling and is therefore applicable only in a comparatively narrow high room.

Summing up, the writer hopes that within a short time it will be possible to get full data on any make of reflector, such as the light-distribution curves, percentage of absorption, etc., so that one can proceed in an intelligent manner to plan a lighting installation and know that one will arrive at some fairly definite result on every kind of job. Most users are willing to pay for what they get and are entitled to the best service to be had, whether it be a large job or a small one.

E. M. Raetz.

Rochester, Minn., October 26, 1914.

New York City Prohibits Old-Style Motor Starters.

Commissioner William Williams of the Department of Water Supply, Gas and Electricity, New York City, announces that on and after January 1, 1915, small-motor starting devices, more particularly those used in connection with commercial sewing machines, will be prohibited, unless they are of types which have been approved by the department since July 1, 1914.

It has been proved that a number of fires have resulted from the use of the old-style starting boxes, and their elimination will be beneficial.

Indirect Lighting for Theater.

The La Plaza Theater, St. Petersburg, Fla., contains an indirect lighting fixture over 12 feet in diameter. It carries eighty 100-watt lamps and twenty 250-watt lamps.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Wiring Old Houses.

In wiring old houses it frequently happens that ceiling outlets must be installed in rooms having hardwood or finished floors above and it is usually impracticable to remove such floors. However, if there is picture molding in the rooms, as is usually the case, it will not be a very difficult matter, and injury to the house will be reduced to a minimum.

Select a point on the wall opposite the outlet and in the same lay between joists as the outlet, and take off the picture molding. Next cut a small hole through the plaster and lath beneath the molding and bore a hole up through the plate on top of the partition by angling up from the above mentioned opening. It is then a simple matter to fish wires or armored cable up from the basement and over to the outlet by means of a steel fish tape.

H. C. Peck.

Switchboard Wiring.

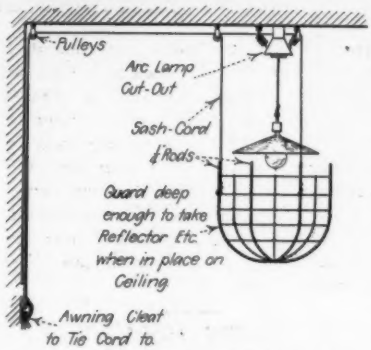
Switchboards coming from a factory are all neatly wired but when additional wiring is done on the board by electricians it is generally slack and full of small kinks. I have used the following method for straightening wire and causing it to fit close to the board. The end of the flame-proof wire to be used should be placed in a vise and one should run over the wire with a piece of waste held tightly in one's hand, the hand being turned so as to take out all kinks in the wire. If a vise is not handy a helper can hold the end of the wire with his pliers and thus keep the wire taut.

H. W. Parsons.

Gymnasium Fixture.

Having to hang two center ceiling fixtures in a large gymnasium with a ceiling about 30 feet high, we used the scaffold which the workmen who put up the ceiling apparatus used, and put up an arc-lamp cutout to which we connected our circuit wires. The reflector and socket for a large unit took one rope of sash-cord. We had a deep guard made up of heavy wire which had several one-quarter-inch rods running through it vertically; these wires were to project about two inches beyond the top rim of the guard and holes were bored in the ceiling just where they struck by being pulled up by three separate ropes as shown.

This made a very rigid guard as


Pulleys
Arc Lamp Cut-Out
Sash-Cord & Rods
Guard deep enough to take Reflector Etc. when in place on Ceiling
Awning Cleat to Tie Cord to

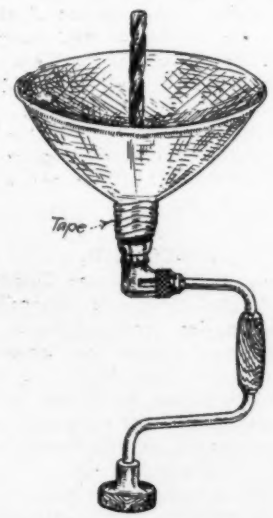
Gymnasium Fixture.

shock of any blow from below was taken up by the ceiling itself. This rig can be lowered for cleaning the reflector or changing the lamp in ten minutes and replaced again in about the same time, and it makes a very satisfactory way to hang such fixtures where there is no attic over the room.

E. M. Raetz.

Catching the Dirt.

To catch the plaster and chips when boring holes in a ceiling, take an old



Device for Catching Dirt.

cone-shaped shade and slip the holder part over the chuck of the brace and tape it on. All the loose plaster and borings will fall into the shade and can be emptied into a waste box or otherwise disposed of after coming down from the ladder.

E. M. Raetz.

Cutting Holes in Steel Cabinets.

It often happens that after a cabinet has been fastened to a wall, more holes must be cut therein and as the thin metal of which such cabinets are made vibrates considerably, it is a rather difficult task. So the writer takes a short piece of conduit the size of the one to enter the cabinet, having a coupling on one end and cuts it off so it just slips tightly into the cabinet, placing the end of the coupling under the point at which the pipe is to enter. I then cut out the circle of steel inside of the coupling with a small cape chisel. This makes a neat round hole and the conduit reaching across the cabinet and resting on the opposite side holds it quite rigid while cutting.

H. C. Peck.

Fishing in Old Building.

In wiring an old flat building I had some trouble getting the outlets fished in the rear part of the building on account of the roof sloping down to within two or three inches of the ceiling. While this can be fished in the ordinary way, it takes a good deal of extra time. I used several pieces of speaking tubes; by pushing these down to the outlet the fish wire can be pulled in. In addition the tubes, being bright, are very easily handled.

Fred Husar.

Supporting Fixtures.

In wiring old houses, where the wires or cable are fished to ceiling outlets, if there are no gas pipes it is hard to secure the outlet box sufficiently rigidly to support a heavy fixture. This may be overcome by cutting out the lath and plaster so that the box just fits tightly in the hole. The box may now be secured by screwing a three-eighths-inch crowfoot to the floor above and dropping from this a three-eighths-inch nipple long enough to project a half-inch through the center knockout of the box. The thread on the bottom of the nipple should be about an inch long, so that a locknut may be placed above and one below the box to clamp it tightly. An insulating joint or hickey may be screwed on the projecting end of the pipe to support the fixture.

H. C. Peck.

Correction—A Good Black Paint.

Through an error it was stated in a wiring kink entitled "A Good Black Paint," by H. E. Weightman in our issue for September 29, 1914, that one of the ingredients was "gibsonite." This is a typographical error, the word being "gilsonite." Gilsonite is a black lustrous kind of asphalt. The word is derived from the name of S. H. Gilson, owner of a large deposit. Gilsonite is often better known as uintahite and is extensively used in the arts.

Public Service Commissions

Conducted by William J. Norton

CALIFORNIA.

The Northern California Power Company, Consolidated, was authorized to issue 5,000 shares of its six-per-cent cumulative preferred stock, having a par value of $100 a share, to its stockholders at not less than $80 a share. Of the proceeds, $225,000 will be used for reimbursing capital account and $175,000 for additions and betterments to the company's property. It is made a condition of the order that the company, on or before December 1, 1914, shall submit to the Commission an inventory and appraisal of its properties, and if any deficiency is found to exist between the sum of the obligations of the applicant and its preferred stock, on the one hand, and the value of the property on the other, the company will be obliged, upon order of the Commission, to levy an assessment upon the stockholders for the purpose of supplying the deficiency.

The San Joaquin Light and Power Company has been ordered by the Commission to furnish electric service in the town of Hardwick, Kings County.

ILLINOIS.

The Springfield Gas and Electric Company was authorized to put in effect its rates issued as of December 1, 1913. A comparison was made, in a number of representative instances, of the amounts of consumers' bills under the old and new rates. The Commission did not pass upon the reasonableness of the rates but based its order upon the reduction effected by the new rates, the form of the rate schedule, and the elimination of discrimination. These rates are to remain in effect until a new rate, based on a valuation of the property, is determined. The rates for residence lighting are 10 cents net or 11 cents gross per kilowatt-hour for the first 30 hours' use per month of active load; 7 cents net or 8 cents gross per kilowatt-hour for the next 30 hours' use per month of active load; 3 cents net or 4 cents gross per kilowatt-hour for all excess used. The difference between the gross and net rates will constitute a discount for prompt payment. The minimum bill is 90 cents net per consumer per month.

KANSAS.

Kansas Postal Telegraph-Cable Company. The Commission has instituted proceedings in the Kansas Supreme Court to compel the Kansas Postal Telegraph-Cable Company to reopen an office at Syracuse, the county seat of Hamilton County. The company had discontinued this office without securing the permission of the Commission. The action, in this case, will test the jurisdiction of the Commission over telegraph companies.

NEW YORK.

New York Edison Company. The Commission for the First District has decided to reopen the rate cases known as Stadtlander and others and Ewoldt and others against the New York Edison Company. The hearings in these cases were closed last July. This was before the war in Europe broke out and since that time, the company alleges, conditions have so changed that they should be taken into consideration before the cases are decided.

OHIO.

The Ohio Service Company was authorized to issue its three-year convertible notes in the amount of $929,807.96, to be applied as final payment for certain properties of the Twin City Traction Company, the New Midland Power and Traction Company, the County Electric Company, and the Lafayette Light and Power Company, the purchase of which had been previously authorized by the Commission.

WISCONSIN.

Oconto Rural Telephone Company. One of the company's subscribers, Charles Epavier, receiving service on a party line, violated the company's rule in regard to "listening in." A number of the subscribers whose service was impaired by the "listening in" notified the company and the Epavier service was discontinued. The Epaviers were willing to agree faithfully to observe all the rules and regulations of the utility if service were restored, but the company rejected all propositions for reconnection, conditionally or otherwise, claiming that several subscribers would withdraw their patronage if Epavier were reinstated. The Commission orders that the service be restored and comments upon the situation as follows:

"The regulation of the company prohibiting subscribers on party lines from 'listening in' except to ascertain whether the line is open or busy is wholly reasonable and promotive of satisfactory service. The breach of such regulation, especially if repeated or accompanied by the use of violent, coarse or abusive language, merits prompt and decisive action by the company to prevent repetition of the offense. Disconnection of service is obviously the indicated punishment and remedy. Repeated, persistent and gross infractions of telephone utility rules might warrant a permanent exclusion from the use of the utility service.

"The 'listening in' and the remarks following were not of a character to warrant depriving the Epaviers of telephone service indefinitely. After suspension of service for a reasonable time reconnection should have been made voluntarily by the company. Nearly eight months time has expired since the deprival of service complained of. Surely this length of penal period might have duly impressed the subscriber in question and in fact the subscribers of the whole operating territory of the company of the advisability of conforming with reasonable fidelity to the regulations of the company.

"The fact that several subscribers threaten to withdraw their patronage from the company if the Epaviers are placed in their former condition of service, as is urged by the company, should be given little or no weight.

"No subscriber of a utility nor any group or number of subscribers can be permitted to dictate or control the service extensions or connections. The duty of a utility is to serve without discrimination, under reasonable rules and regulations, all people desiring service who subscribe to and abide by such regulations. The call for service though coming from an individual partakes strongly of the character of a public demand. We are of the opinion that the telephone service of Mr. Epavier should be reinstated."

The New Lisbon Telephone Company was authorized to put in effect a new schedule of telephone rates. The company has purchased the property of the Juneau Electric Company and proposes to operate as one system its original property and that acquired from the Juneau Company, thereby furnishing an improved class of service.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 240.—Life of Gas-Filled Tungsten Lamps.—What is the longest life record as yet attained on test or in service with the new nitrogen-filled tungsten lamps?—P. C. U., Springfield, O.

No. 248.—Misuse of "Electric."—Cases have frequently come to my notice of the evidently intentional misuse of the word "electric," such as electric soap, electric razor, electric shoe polish, etc. Now while such use of the word is mostly harmless and is readily detected by electrical men as an attempted flattery, in many instances it is palpable deception with intent to defraud the uninitiated and in too many cases not only does mislead buyers but gives a bad repute to things truly electric. Has this matter ever been taken up by any national or local electrical society with the aim of securing legislation to prohibit misuse of the word?—A. E., Chicago, Ill.

No. 249.—Automatic Open-Circuit Tester.—In some fire-alarm systems of the open-circuit type I am told that some device is provided for automatically testing the lines from time to time to see that they are in working condition. How is this done? Has it been used to check the condition of telephone lines?—D. K. Y., Ogden, Utah.

No. 250.—Laundry Wiring.—The laundries in a large apartment building are to be wired so that each tenant can use an electric iron or washer on his own circuit. Have any special lock switches been devised to permit this and to insure that no tenant will use current from any other tenant's circuit? Are any special precautions necessary in wiring such a scheme?—F. M. L., Milwaukee, Wis.

Answers.

No. 235.—Size of Rotary Converters.—What limits the size or capacity for which a rotary converter can be built? I understand that certain railways would like to use sizes larger than the manufacturers can furnish.—C. A., Washington, D. C.

The impression that the manufacturers are endeavoring to limit the size of rotary converters is incorrect. There have so far been no sales of 25-cycle converters above 4,000 kilowatts or of 60-cycle converters above 2,500 kilowatts, but much larger machines have been estimated upon by the manufacturers for projects which as yet have not materialized. It is apparent, by checking the design constants and the actual physical dimensions of the rotary converters of latest design, that no appreciable difficulties would be experienced in manufacturing converters 100 per cent larger. The actual commercial demand is what is limiting the size of rotary converters. At present, apparently, there is no need of concentrating a greater amount of power. This point will be the better appreciated when it is understood that a single 4,000-kilowatt rotary converter has a momentary capacity of 12,000 kilowatts, sufficient to start simultaneously three or four New York Subway trains.—J. L. McK. Y., Pittsburgh, Pa.

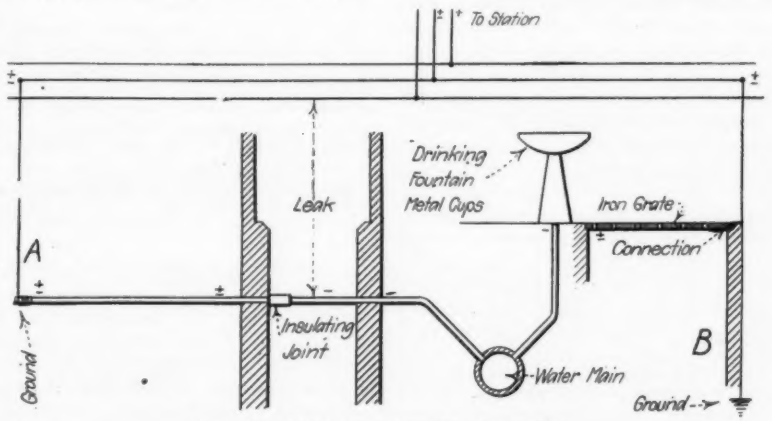
No. 241.—Electricians in Mexico.—Do any of your readers know what are the prospects for an electrician in Mexico, assuming that country to have settled down to a state of peace and industrial development?—N. D. G., Oklahoma City, Okla.

The present conditions in Mexico are so unsettled that it is still impossible for Americans engaged in the electrical industry to find any employment. The writer has personally talked with over a dozen electrical men who have had to leave that country because of the unsettled conditions. During normal times, Mexico offers a very attractive field for the electrical men. Wages and salaries payable in gold range from thirty to one hundred per cent more than in the United States. The living conditions, however, are in no way comparable.

A great deal of electrical development has been carried on in Mexico during the past ten years, not only with regard to extensive water-power projects, but also a number of private enterprises for the supplying of power to the mining industries. Judging by the present outlook, however, it will be some time before a state of peace and industrial development is reached.—M. C. H., San Francisco, Cal.

No. 243.—Polyphase Rectifier.—Is it possible to change a polyphase 60-cycle current into a direct current for series arc lighting by means of a mercury-arc rectifier without unbalancing the phases? If this is possible, how is the rectifier built and connected?—P. J. T., Dubuque, Iowa.

It is perfectly feasible to build a polyphase 60-cycle mercury-arc rectifier for connection to three-phase circuits in order to supply a direct-current series arc-lighting circuit. This could be accomplished by means of three constant-current transformers, one connected to each phase and all of them in turn connected to a rectifier having three sets, instead of one set, of anodes. The load in this case would be balanced, and the direct current obtained from the rectifier would have a much smaller "ripple" than with a single-phase rectifier. I do not believe, however, that this has ever been commercially done. The querist is referred for further information to an article by R. P. Jackson on "The Theory of the Operation of Mercury Rectifiers" in the June, 1912, number of the *Electric Journal*.—M. C. H., San Francisco, Cal.



No. 244.—Shock from Ground Connection.

No. 244.—Shock from Ground Connection.—I have just heard of a peculiar case of shock, which I should like to have explained. The wiring in a building was on three-wire system with neutral well grounded onto the water pipes of house. No shock was noticeable in basement or elsewhere in house, but when standing near to and touching a fire hydrant in front of house a shock could be distinctly felt; it was not serious, but attracted children passing by. What caused this?—W. S. C., Chattanooga, Tenn.

A similar case to this occurred in a local factory. It is roughly sketched in the diagram herewith. In building *A* the neutral was grounded to the water service. In building *B* a ground plate was used and the iron grate became connected to this ground. *B* was a locker and bath building and conse-

quently was more or less damp. The earth around here was mixed clay and cinders, having been built up to a higher grade. When the trouble was hunted down it was found that the negative side of the circuit had become partly grounded on a pipe outside the building and that the ground was not of sufficient conductivity to *B* to blow fuses but enough to give a shock at the metal cups in the drinking fountain. No shock was felt in *A*, however, on account of an insulating joint in the pipe. Its purpose was to prevent electrolysis of the reinforced-concrete structure. The leak was removed, as also was the ground in building *A*. The neutral is now grounded outside on all these buildings and insulated inside.—H. E. W., Chicago, Ill.

Water pipes laid in coarse gravel or cinders form a very poor ground. It is also sometimes expedient in laying a water main, to use a wooden gasket between pipe sections which do not exactly line up in laying, as when pipe must take a detour to the side to pass an obstruction. In this manner it would be possible for the pipe between service and gasket to hold a considerable voltage above ground, and the fire plug, being inside the curb in the comparatively dry ground, while the street might be wet from sprinkling, would be capable of giving a smart shock. I have found, in tests made to determine effect of electrolysis, places where there was as much as 28 volts drop between a fire plug and adjacent metal poles.—E. R. F., Dixon, Ill.

No. 245.—Merchants' Ornamental Street Lighting.—Why are most of the installations of ornamental cluster lamps put up for merchants on business streets wired for multiple instead of series lamps? Why is it customary to turn each post on and off by hand instead of controlling the entire circuit by a single switch at the power house or substation?—D. K. W., Milwaukee, Wis.

Most of the installations of ornamental business-street lighting have been installed for the benefit of the merchants on those streets and are operated only in the early part of the night. Many installations are made piecemeal, a post being placed here and there only in front of the stores of the merchants who have paid for the same. Under these conditions it is evident that in order to supply this service at the lowest possible cost a central station cannot afford to run a separate circuit from its station or substation for this purpose and at the same time put in the necessary constant-current regulating equipment required for series systems. Therefore it is customary to tap the nearest standard distributing or service circuit, in some cases in the basement of the store, in others at alley crossings of the distributing pole lines. If only a few isolated posts are being put up, as is likely to be the case, the former method is used; if practically an entire block is to be lighted, a separate branch circuit from the alley pole line is used. In either case multiple, standard 110 to 115-volt lamps are the only ones practical for the purpose. In the case of isolated poles, hand control of the lights by a patrolman is the only practical control. If several blocks are lighted, time switches are being used in many places with complete success.

When the installation involves the entire business district of a town or practically all its streets and where extensions or additions are not likely to be made except in such numbers of lamps as will justify a complete new circuit, there is no advantage but rather a disadvantage in using multiple circuits. Consequently a number of cities in which these conditions prevail, particularly where the city pays for the operation of the system, have adopted the series system and are getting excellent results from its use.—R. T., Gary, Ind.

No. 246.—High-Frequency Insulation Tests.—I notice the statement frequently made of late that tests of insulators at high frequency are more dependable than those at the operating frequency of the circuit, such as 25 or 60 cycles, on which the insulators are to be used. What is the basis of this assertion? Is it verified by actual experience?—S. B., Joliet, Ill.

It is a matter of experience that insulators tested at commercial frequencies, 25 to 60 cycles, fail in service when subjected to high-frequency high-potential stress. In the laboratory it has been found that insulators standing up under test at high frequency remain undamaged at commercial frequencies, whereas insulators withstanding high potential at 60 cycles often fail when subjected to a lower potential at higher frequencies.

In service, insulator failure is generally due to surges set up by lightning, arcing grounds and similar causes. Such oscillations of high potential, double or more, may be, and generally are, of very high frequency. Testing with high frequency high potential is thus seen to represent the most severe service conditions.

By using high frequency it is found that flaws in the porcelain are more easily found, because the corona spreads out along, and adheres to, the surface of the insulator more closely than with low frequency. The advantage of testing insulators with high-frequency potential have been amply verified. Oscillating transformers, designed especially for this class of work, are now on the market, capable of giving 170,000 volts at a frequency of 200,000 cycles.—I. L. K. R., Chicago, Ill.

No. 247.—Phase Transformation.—Is it possible to statically (that is, by a device having no mechanical moving parts) change three-phase current into one single-phase current without unbalancing the phases? If this is possible, how is the device constructed for accomplishing the same? What is its efficiency? Is this method being commercially used?—H. D., Detroit, Mich.

The question of three-phase to single-phase transformation by means of static transformers is a rather old one. Such transformation is not possible, due to the fact that in a normally operating symmetrical three-phase system flow of energy is uniform. On the other hand, in the single-phase system one of the principal characteristics is an intermittent flow of energy, namely: at certain moments the energy is zero. It is therefore impossible to convert from three phase to single phase and continue the normal operation in both systems, unless there be some provision for storage of energy, and such a means of storing energy is not found in ordinary transformers. Consequently rotating machinery is needed. This question was very thoroughly covered by means of some rather interesting analogies by Mr. Charles S. Scott in an article in the January, 1906, issue of the *Electric Journal*.—M. C. H., San Francisco, Cal.

It is impossible to deliver single-phase current from a three-phase source of supply statically without causing an unbalance on the three-phase side. Single-phase power changes every half cycle from a maximum to zero and back to a maximum again, while the flow of polyphase power is at a continuous rate. To maintain the three-phase side balanced it is necessary to store energy, which the transformer cannot do, during the time that the power taken by the single-phase side is less than that received into the three-phase side.—I. L. K. R., Chicago, Ill.

Railway Company Establishes Appliance Department in Passenger Waiting Room.

The Cumberland County Power & Light Company, Portland, Me., which controls the Portland Railroad Company, the electric traction system of the city, is remodeling the railway waiting room at the corner of Congress and Elm Streets, so as to make it include a show room for electrical appliances. Large show windows on the two street sides will contain a fine display of lamps and household devices, and narrow counters along the other walls will be used for the sale and exchange of lamps and appliances. The room will be 30 feet by 60 feet in floor area.

Doubtless the attractive displays, with opportunity to purchase and make inquiries on the part of waiting passengers, will be of great advantage to the lighting company's sales department.

Electrical Engineering Problems.

By R. G. Hudson and W. V. Lyon.

DIRECT CURRENTS.

Problem 8.

A cast-steel ring, 10 inches in mean diameter, contains an air-gap 0.3 inch in mean length, as shown in Fig. 8.

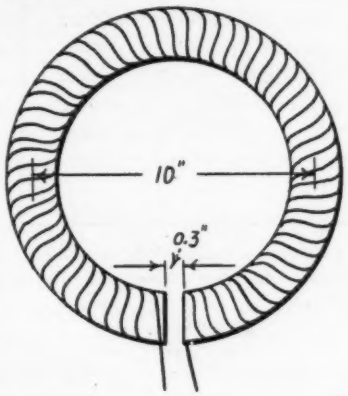


Fig. 8.

The cross-sectional area of the ring is three square inches.

Assuming that the magnetic flux is confined to the ring and crosses the air-gap in straight lines, find (*a*) the number of ampere-turns required to establish a magnetic flux of 150,000 maxwells through the ring; (*b*) the ratio of the number of ampere-turns required to establish this flux in the air-gap to that required in the iron; (*c*) the flux established in the ring without the air-gap when there are 500 ampere-turns wound about the ring, and (*d*) the pull in pounds between the two surfaces facing the air-gap under the conditions of Question (*a*).

SOLUTION OF PROBLEM 8.

The total magnetic flux (ϕ) established in a magnetic circuit is given by

[25] $\phi=3.19NI/(l_1/\mu_1A_1+l_2/\mu_2A_2$, etc.),

where (N) represents the total number of turns carrying the current (I); (l_1l_2, etc.) represent the lengths in inches, and (A_1, A_2, etc.) represent the areas in square inches of the respective series sections of the magnetic circuit in which the permeabilities are (μ_1, μ_2, etc.) respectively.

The permeability (μ) of iron or steel varies with the magnetic flux density (B) established in the iron or steel. The permeability of cast-iron, cast-steel and sheet-steel for various flux densities, expressed in lines per square inch, is given in Fig. 9. The permeability of air or copper is 1.

Answer to Question a.

The flux density (B) in the iron or in the air-gap equals 150,000/3 or 50,000 lines per square inch. Hence, the permeability (Fig. 9, cast-steel curve, B=50,000) equals 1,350.

Substituting in [25] (l_1) equals $\pi\times$ 10—0.3, or 31.1 inches; (l_2) equals 0.3 inch; (A_1) and (A_2) equals 3 square inches; (μ_1) equals 1,350; (μ_2) equals 1, and (ϕ) equals 150,000. We have by [25]

150,000=3.19NI/(31.1/1,350×3+.3/3)

and (NI) equals 5,060 ampere-turns.

Answer to Question b.

The number of ampere-turns required to establish a flux of 150,000 lines in the air-gap alone is given by [25]

150,000=3.19NI/(.3/3),

and (NI) equals 4,700 ampere-turns.

Similarly, the number of ampere-turns required to establish a flux of 150,000 lines in the iron alone is given by [25]

150,000=3.19NI/(31.1/1,350×3),

and (NI) equals 360 ampere-turns.

The ratio of the two then equals 4,700/360, or 13.

Note that it requires 13 times as many ampere-turns to establish the flux in a 0.3-inch air-gap, as in the 31.1 inches of cast-steel. It is for this reason that the air-gaps in electrical machinery are made as small as possible when other conditions do not necessitate a large air-gap.

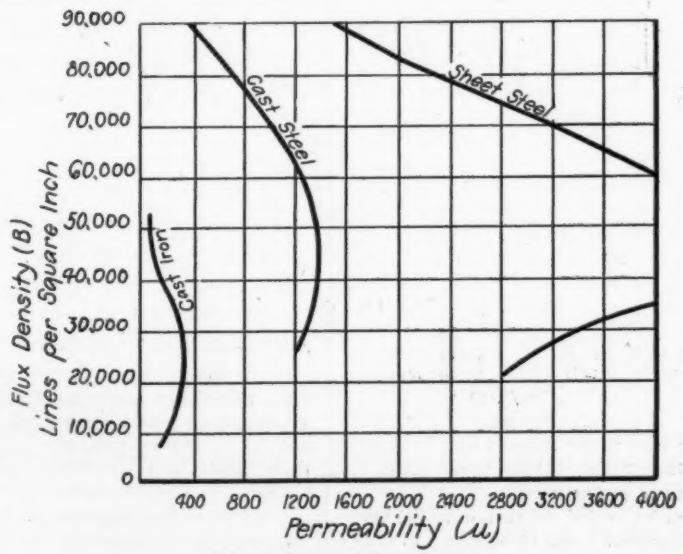


Fig. 9.—Permeability Curves.

Answer to Question c.

When the air-gap is closed up, the flux (ϕ) is given by [25]

$\phi=3.19\times500/(31.4/\mu3)$.

Since the permeability (μ) of iron is known only when the flux density (B) is known, it is necessary to assume some value for (μ) and then determine the value of (B). This process must be continued until the value of (μ) corresponds with the value of (B) given in Fig. 9. Assuming (μ) to be 1,000, by [25]

$\phi=3.19\times500/(31.4/1,000\times3)=152,000$ lines.

The flux density (B) thus equals 152,000/3 or 50,700 lines per square inch, and the permeability corresponding to this value of (B) (Fig. 9) is 1,350. The actual permeability must fall somewhere between 1,000 and 1,350, say 1,220. Then by [25]

$\phi=3.19\times500/(31.4/1,220\times3)=186,000$ lines.

The flux density (B) equals 186,000/3 or 62,000 lines per square inch, and since the actual permeability (Fig. 9) is 1,220 when the flux density is 62,000 lines per square inch, the above result, ϕ=186,000 lines, stands as the correct solution of the problem.

Answer to Question d.

The tractive force (F) existing between two magnetic poles placed close together is given by

[26] $F=B^2S/72\times10^6$ pounds,

where (B) represents the flux density in lines per square inch uniformly distributed over the end surfaces of two poles, each (S) square inches in area.

ALTERNATING CURRENTS.

Problem 58.

Three unequal single-phase loads are connected in Y between the mains and neutral conductor of a three-phase circuit. The line voltages are all equal and the voltages from the lines to the neutral conductor are each 110 volts. The first of these loads consists of incandescent lamps which take a current of 152 amperes; the second consists of several small single-phase motors which take a combined current of 224 amperes and a total power of 19.1 kilowatts; the third load is a 15-horsepower, single-phase motor which is delivering its full load at a rated efficiency of 87.2 per cent, and a power-factor of 96 per cent. (*a*) What is the total power supplied; (*b*) What is the current in the neutral conductor?

Since under the conditions of Question A, (B) equals 50,000 lines per square inch and (S) equals three square inches, we have, by [26]

$F=(50{,}000)^2\times 3/72\times 10^6=104$ pounds.

SOLUTION OF PROBLEM 58.

Answer to Question a.

Lamp load, $P_1=110\times 152$,
$=16{,}720$ watts.
$P_2=19{,}100$ watts.

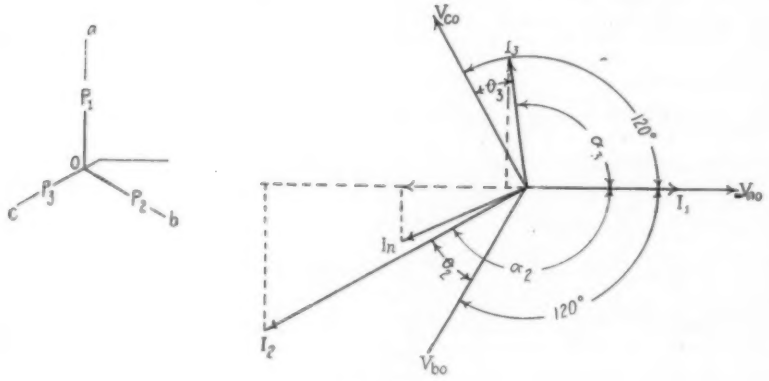


Fig. 12a.

The efficiency (e) of any apparatus is equal to the output divided by the input.

$P_3=15\times 746/0.872$,
$=12{,}830$ watts.

The total power supplied is:

$16{,}720+19{,}100+12{,}830=48{,}650$ watts

Answer to Question b.

In order to find the current in the neutral conductor it will be necessary to draw a vector diagram showing the phase voltages and currents. See Fig. 12a. At the left is given the diagram of connections and at the right, the vector diagram.

The phase voltages, V_{ao}, V_{bo} and V_{co} are each 110 volts and are displaced in phase by 120 degrees. The current, I_{ao}, in the lamp load is in phase with its voltage. The current in the second load lags by an angle θ_2 behind its voltage, and the current in the third load by an angle θ_3 behind its voltage. If we choose the axis of reference along the first voltage, the current in the lamp load will be along the axis, and the currents in the second and third loads will make angles of α_2 and α_3 with the axis.

$\alpha_2=120+\theta_2$
$\alpha_3=120-\theta_3$

The current, I_n, in the neutral conductor is the vector sum of the currents in the three phases. That is, $I_n=I_{ao}+I_{bo}+I_{co}$.

By [1a] $Cos\ \theta_2=19{,}100/110\times 224$,
$=0.775$.

From tables, $\theta_2=39.2$ degrees.
$Cos\ \theta_2=0.96$
From tables, $\theta_3=16.2$ degrees,
Therefore, $\alpha_2=159.2$ degrees.
and $\alpha_3=103.8$ degrees.
From tables: $Cos\ \alpha_2=0.935$.
$Sin\ \alpha_2=0.355$.
$Cos\ \alpha_3=0.239$.
$Sin\ \alpha_3=0.971$.
By [1a] $I_2=12{,}830/110\times 0.96$,
$=121.5$ amperes.
Horizontal component
of $I_1=152$.
of $I_2=-224\ (0.935)$,
$=-209.5$.
of $I_3=-121.5\times(0.239)$,
$=-29.0$.
Resultant horizontal component (I_h):
By [26a] $I_h=152-209.5-29.0$,
$=-86.5$.
Vertical component
of $I_1=0$.
of $I_2=-224\times(0.355)$,
$=-79.5$.
of $I_3=121.5\times 0.971$,
$=118$.
Resultant vertical component (I_v):
By [26a] $I_v=0-79.5+118$
$=38.5$.
By [27a] $I_n=\sqrt{86.5^2+38.5^2}$
$=94.7$ amperes.

Vermont Water-Power Development.

Clark C. Fitts, of Brattleboro, Vt., recently addressed the Merchants' Association of Burlington on the state and the prospects of water-power development in Vermont. He pointed out the existing difficulties by reason of the ancient riparian rights held by the owners of the lands adjoining the rivers. There is popular clamor that large financial interests control the larger part of water powers in New England, said Mr. Fitts, but actually more than half the power rights are in the hands of the original owners or their descendants.

It was pointed out that the State can develop more than two million horsepower from its streams—an advantage equal to bringing the coal mines from Pennsylvania. The Deerfield River, in Southern Vermont and Massachusetts, with a fall of 1,100 feet, develops 125,000 horsepower of electrical energy, which is an equivalent of 650,000 tons of coal yearly.

In southern Vermont, Mr. Fitts said, there are large deposits of low-grade iron ore, which could be made workable by the use of electric power.

Mr. Fitts said governmental regulation fails because it tries to follow two policies, the Sherman law and Interstate Commerce Commission decisions. The proprietary control of the resources of the State, he held, should be under state and not governmental regulation. He advocated the lending of money by the state of Vermont to construct reservoirs to conserve the stream flow.

Power Development on St. John River.

The recent appointment of John B. Madigan, of Houlton, Me., as a member of the International St. John River Commission to fill the vacancy caused by the death of George A. Murchie, of Calais, Me., means the early resumption of the commission's business. Among the most important matters to be decided by the commission will be the regulation of the power development of the Grand Falls of the St. John River. The development is regarded as the largest east of Niagara, the estimated maximum being 80,000 horsepower.

When the commission has finally passed on the matter, work will begin on a large pulp and paper plant by capitalists allied with the International Paper Company.

Purchases of Maine timberlands on St. John waters have been made.

DIRECT CURRENTS.

Problem 9.

The copper-clad iron armature of a homopolar dynamo, shown in cross-section in Fig. 10, has a diameter of four inches and revolves at a speed of 3,600 revolutions per minute, the top of the armature turning downward into the paper. When a current of 10 amperes supplied from an external source flows in the stationary field-coil, *FF*, a magnetic flux flows through the rotating armature and stationary field yoke as shown by the dotted lines. The flux density in the air-gap is 50,000 lines per square inch. Each pole-face of the field surrounds the entire armature and has an axial length of four inches. Four sets of brushes *A*, *B*, *C* and *D* surround the armature and are connected as shown in the figure. The internal resistance between the terminals *A* and *D* is 0.004 ohm.

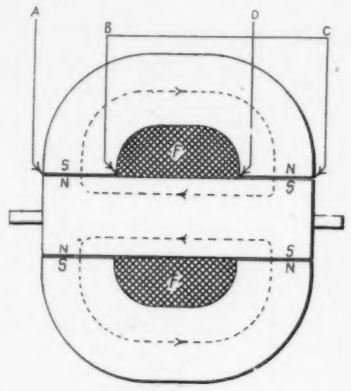


Fig. 10.

Find (*a*) the emf. between the brushes *A* and *B*; (*b*) the direction of the emf. within the armature between *A* and *B*; (*c*) the emf. between the terminals *A* and *D*; (*d*) the current flowing in the armature when an external resistance of 0.026 ohm is connected between *A* and *D*, and (*e*) the potential difference between *A* and *D* after the above external resistance is connected between the terminals.

This problem illustrates the fundamental requirements for generating an electromotive force in a dynamo-electric machine.

ALTERNATING CURRENTS.

Problem 59.

A 60-cycle transformer that is rated to deliver 100 kilovolt-amperes has a ratio of transformation of 11,000 volts to 2,200 volts. There are 900 turns in the high-tension winding. The magnetic circuit has an average length of 47 inches and a cross-section of 66 square inches. With the secondary or low-tension circuit open, and with the rated voltage impressed on the high-tension winding, 940 volts is supplied and the current is 0.34 ampere. (*a*) How many turns are there in the low-tension winding? (*b*) What is the maximum flux density in the core? (*c*) What is the iron loss in watts per cubic inch? (*d*) If, in this case, the eddy-current losses are 24 per cent of the total core loss, what would have been the no-load power had the magnetic core been built up of half as many laminations of twice the thickness? (*e*) When this transformer delivers 90 kilowatts at 0.8 power-factor and the rated voltage on the low-tension side, what are the high and low-tension currents?

This problem illustrates the current and voltage relations in a transformer.

Solutions of the above problems and two new problems will be printed in the next issue.

Rejuvenation in Kansas City.

"Twenty-six candidates were initiated into the Jovian Order at the best rejuvenation ever held in Kansas City." This was the announcement of the ceremonies held recently at the Coates House, Kansas City, Mo., under the direction of R. D. Obermeyer, statesman.

Cleveland's New Municipal Lighting Plant's Operating Costs High?

That the cost of producing current at the new East Fifty-third Street plant of the Cleveland municipal lighting department is unexpectedly high, for reasons which have not yet become clear, appeared last week when it was admitted by the engineers in charge of the plant that the cost per kilowatt-hour at the new plant was 2.6 cents, whereas it was anticipated before the plant went into operation that the cost would be below 0.69 cent. The latter figure was fixed, it is understood, by Lighting Commissioner Ballard, in consultation with engineers representing the Cleveland Illuminating Company and the Cleveland Railway Company, as a fair cost figure for the production of current, when the question of the rate to be charged the railway company by the power company for power was being discussed. In August, according to Mr. Ballard's figures, the cost of producing current at the new plant was 3.3 cents, but as this was the first full month of its operation no better showing was expected. When the figures for September dropped no lower than 2.6 cents, however, there was felt to be room for some worry, as the current is sold for three cents, and the margin is not profitable, in view of the fact that the plant cost over $2,000,000. It is stated by the lighting department, however, that the city's other plants are earning well, and making a profit. Tests of the new plant have been conducted by Prof. Carl C. Thomas, of Baltimore, and full reports covering these tests, which may reveal the source of the trouble over the high cost of current, have been submitted to the city council.

Electrical Wiring to be Taught at Louisville Prevocational School.

The Louisville, Ky., board of education, which established a "prevocational school" last year, has enlarged the work this season by including a course in practical electrical wiring, taught by an experienced man. The school, as the name indicates, is intended to assist boys who are forced to discontinue their education before completing high-school to select a vocation for which they are adapted, and in which the opportunities for advancement are good. The other subjects taught in the school are printing, bookbinding and woodworking. Lighting and bell-wiring have been the subjects taught thus far, and later on telephone wiring will be taught. The provisions of the National Electrical Code are being followed in the instruction. The electrical contractors of Louisville are much interested in the work and are planning to assist it in carrying on the instruction.

Electric Vehicle Association of America.

Fifth Annual Convention, Philadelphia, October 19-21.

With practically 50 per cent of the total membership in attendance, the fifth annual convention of the Electric Vehicle Association of America was held at the Bellevue-Stratford Hotel, Philadelphia, Pa., October 19 to 21. In actual results accomplished, the convention marks a new epoch in the history of the Association, and in fact it is seldom that so much business is transacted in so short a time by any association. Seven sessions were held during the three days of the meeting, three on Monday, and two on each of the other days.

The papers and discussions indicated a closer co-operation between the various interests represented in the electric-vehicle industry, and while the millennium has not yet been reached, considerable improvement was apparent over previous conventions. Greater standardization in all matters was evidenced by the reports of the various committees, the only point of issue being opinions regarding the future development of the electric passenger car. Considerable of the discussion related to the prophecy made by Dr. Charles P. Steinmetz at the recent convention of the National Electric Light Association that an extremely low-priced electric would be marketed.

Rudolph Blankenberg, mayor of Philadelphia, welcomed the delegates to the city at the opening session on Monday morning. He spoke briefly of the future of electricity, particularly of the electric vehicle, mentioning that there are at present approximately 60,000 horses in the city, and each installation represents a prospective user of an electric vehicle.

Frank W. Smith, president of the Association, then delivered the annual presidential address, which summed up the vehicle situation in such a comprehensive manner that it was unanimously decided to have extra copies printed and distributed to all interested in the electrical vehicle.

President Smith discussed the work accomplished during the year with special reference to meetings held, membership increases, section activities, financial condition, publicity, co-operation, etc. Speaking of electric vehicle growth he said that it is certain that the electric will be ready to "deliver the goods" when the time comes. The adoption of the electric commercial vehicle to new fields has met with marked success during the past year. This is particularly true in the case of municipal apparatus, including electrically operated garbage collecting and sterilizing wagons, fire department equipment, etc., and the elasticity of the electric has been still further demonstrated in internal trucking and in several new fields of transportation. It has made good in the hauling of ice in the West Indies and has entered Australia and Japan, it has successfully solved the problem of moving broken wagon-lot shipments in railroad yards, thus demonstrating the possibility of its replacing the switch engine in this work. Improvements are noticeable in winch-equipped trucks. Further improvements in equipping and handling heavy trucks for use in hilly cities have also been made during the past year.

Important developments in worm-driven vehicles for lighter classes of delivery have also been effected and the electric tractor is now used to a considerable extent. In fact, the electric commercial vehicle, using the term broadly and including all sorts of highly specialized vehicle applications, has indeed firmly established itself.

A number of manufacturers have given serious thought to the development of a moderate price delivery wagon, and one important manufacturer exhibited at the annual Electrical Show in New York, held October 7 to 17, a 750-pound delivery wagon intended to meet the requirements of small tradesmen, such as bakers, grocers, laundrymen, etc., at $875. An interesting plan of garaging and caring for individual vehicles is included in the selling plan. Other developments are to be expected in this direction.

There is unquestionably great opportunity for a large volume of commercial vehicle business in the field occupied by the small buyer. This field has not been developed to any extent and should have the attention of all concerned.

In the passenger field, Mr. Smith said, the electric is growing in popularity with the discriminating class and among the more substantial people of the country. More men are using it every day and many are finding that the electric meets most of their needs. The electric does the work with comfort and efficiency in many professional and personal fields. The statement is now very generally made that under certain conditions the electric is, as the doctor would say, "indicated." And when once this type of passenger vehicle is purchased its use is continued and this influence is bearing fruit.

A number of important developments have manifested themselves through the year in the announcement by the manufacture of the 1915 models, these models showing improvements in many important details as to weight, comfort and convenience, mechanical and other equipment. Several manufacturers have increased their line of passenger vehicles.

Misunderstanding is apt to be created in the public mind by general statements expressed by those uninformed as to what should constitute a low-price car and in consequence thereof harm may be done to the business at the present time.

There are many whose views are worthy of attention, however, who believe that there is a market for the low-price electric vehicle and every effort consistent with the demand and prevailing conditions should be made by the manufacturers to cover such a field if it exists.

The passenger electric, however, is not necessarily in competition with the lower price motor vehicles of other types, and output is the controlling factor with which the manufacturer must contend. This is necessarily so because of the nature of the present popular type of electric vehicle—the inclosed coupe or brougham, with its battery, motor, controller, expensive body and necessary efficient mechanism.

The one certain solution to the problem of introducing and successfully marketing a low price electric is increased output, and if doubling or tripling the present output would produce costs which would permit of competition in the field of lower price motor vehicles there should be manufacturers both with capital and courage to seek these lower costs.

There will continue to be a market for the exclusive and luxurious passenger car in the electric as well as in other motor propelled vehicles and this field is well covered.

There has been some development through the year in a somewhat lower priced, but still well designed and well constructed car.

There is a continued downward trend in the rate per kilowatt-hour for electric vehicle battery charging. Lower schedules of rates are reported from several sections of the country.

In New York City, for instance, the average rate over a period of about three years has decreased in the neighborhood of 25 per cent. The local cen-

tral station companies in that city have announced, effective November 1, an important reduction in the minimum monthly guarantee required under the storage-battery rate, namely, from $25 to $10 monthly.

This further reduction is particularly advantageous to the customer who uses but one car and should be an important factor in the case of the privately garaged passenger and small commercial vehicle.

The outbreak of war among the leading European countries in the closing days of July has had, and will no doubt continue to have its effect on our industry as in other directions. This disturbance coming, as it did, at a time when this country was gradually gaining strength in business and when the outlook was continually growing more encouraging, was indeed exceedingly unfortunate and there is evidence of depression in business due to prevailing conditions.

This was followed by the report of A. Jackson Marshall, executive secretary of the Association. Mr. Marshall's report covers in detail the growth of the Association during the past year, and covers the work done by the various committees and the central office. Attention is called to the registration of automobiles in the various states, in the majority of cases no provision being made for the separation of electric and gasoline car statistics. The Association, with a view to effecting a uniform method of reporting automobile registration, wrote to the secretary of each of the forty-eight states, asking that hereafter the type of car be designated when registering.

At this point the Washington delegation, led by E. S. Marlow, arrived, having made the trip from Washington to Philadelphia in two electric vehicles. Mr. Marlow presented a message which he personally brought from Washington from President Wilson, which read as follows: "It is a pleasure to extend my greeting and best wishes to the members of the Electric Vehicle Association of America, and to express my earnest wish that their industry, and all those which are connected or associated with it, may prosper. It is my sincere hope that the business men of America may find for themselves and for their employees in the coming months that reward for every legitimate and intelligent endeavor which they seek, and which, through their skill and energy, they deserve."

The report of the Constitutional Revision Committee was then presented. The amendments were voted on separately and passed unanimously.

The reports of the various section chairmen were then presented, each indicating greater interest in section work by local members, and outlining plans for the coming year. In all, 14 sections were heard from.

In the report of the Membership Committee, presented by J. F. Becker, the energetic and successful campaign for new members carried on during the past year was outlined in detail. At the time of the convention, the total membership had been increased from about 450 to 885, and during the course of the meeting, the membership was brought to the imposing figure of 927. The geographical distribution of members is shown, in a chart which forms a part of the report, and the classification of members according to line of business engaged in is also shown.

A Nominating Committee was then appointed by President Smith, composed of W. H. Blood, Jr., G. H. Kelly, G. B. Foster, W. G. Bee, and P. D. Wagoner.

The report of the Committee on Legislation was then presented by P. D. Wagoner, chairman. This report summarizes the legislation enacted in the various states during the past year, which dealt in any way with the automobile or the electric vehicle industry. The Committee reported that it endeavors to co-operate with the geographical sections in obtaining equitable legislation.

Monday Afternoon.

The report of the treasurer, Day Baker, was presented at the afternoon session. This shows the finances of the Association to be in sound condition, particularly since the advertising fund has been diverted to the general association account. He suggested that the Association raise additional funds for the coming year, in order to carry out the general publicity and welfare work which is contemplated. Mr. Baker then presented a paper outlining the activities of the Electric Motor Car Club of Boston, of which he is president. This club co-operates with the New England Section of the Electric Vehicle Association, confining its activities, however, to Boston and vicinity. The club co-operated with the Edison Illuminating Company in the holding of an electric vehicle Salon recently, which was very successful. Various activities tending to promote interest in electric vehicles were outlined.

The report of the Committee on Parcel Post Delivery was then presented by James H. McGraw, chairman. This committee stated that the electric vehicle has not received from the postal authorities the consideration that it deserves. Considerable effort has been expended to bring the merits of the electric vehicle to the attention of the authorities at Washington, and in this work the Committee has co-operated with a committee from the National Electric Light Association. A booklet dealing with the electric vehicle in parcel-post service has been prepared and distributed to all postmasters and others interested. Data are presented on the parcel post traffic in various states which show the possibilities for electric delivery.

This report was discussed by W. P. Kennedy, who pointed out that at present 75 per cent of parcel-post packages are delivered by the regular carriers. There is every possibility, however, that this will not be continued, because of the increasing volume of business, and some form of vehicle will have to be employed. He stated that in thirty instances where present vehicle contracts are to expire the electric is to receive favorable consideration when new contracts are made.

P. D. Wagoner spoke of conditions in New York City, where the mail contractor specified gasoline machines exclusively. He was finally prevailed upon to purchase electrics, and now 50 are in service. It was stated that additional electric vehicles will be purchased as opportunity arises.

E. S. Mansfield, of Boston, reported that the electric vehicle was to receive consideration by the Boston postal authorities as a result of the co-operative work done in that city by the various vehicle interests.

The report of the Committee on Garage and Rates was read by George B. Foster. This Committee reported that it thought it could best serve the Association by starting to collect and compile data on facilities for electric vehicle charging outside of the large centers of population. With this in view, the Committee compiled data regarding charging facilities along the route of the Lincoln Highway, which are tabulated and shown graphically on a comprehensive map of this road. The report was discussed briefly by G. H. Kelly, of Cleveland, E. S. Mansfield, of Boston, R. F. Lloyd, Philadelphia, F. W. Smith, New York, Day Baker, Boston, S. G. Thompson, Newark, and P. D. Wagoner, of Long Island City. Mr. Kelly stated that the manufacturers do not advocate the electric passenger car as a touring car, and for this reason the data presented by the Committee are of little value. He thought the manufacturers should concentrate their efforts in the 225 cities having a population of 25,000 or over.

Mr. Mansfield thought that the work done by the Committee would tend to stimulate interest in the cities along the Highway which did not at present maintain charging facilities. He thought that this interest could be

fostered through the local geographical section.

Mr. Lloyd pointed out that the Committee did not, by its report, endeavor to advocate the electric as a touring car, but had in mind the general publicity that would follow because of the prominence of the Lincoln Highway. Other speakers presented incidents and statistics showing that cross-country runs have been and are being successfully made by the electric vehicle.

P. D. Wagoner thought that the public would not adopt the electric for touring purposes until greater average speed is possible, and until a day's run can be made on one charge.

James H. McGraw then presented a paper entitled "Stimulating Electric Vehicle Progress." Mr. McGraw advances three causes for the heretofore limited progress of the electric vehicle, aside from the generally depressed conditions of business throughout the country. The three reasons for the slow growth are: (1) The novel character of the business which, while it has brought large installations in the commercial field and successfully launched the passenger car, has been depended upon to carry the business to a point where exhaustion has set in. (2) Those responsible for the administrative conduct of the business have done little in a constructive or creative way to open up new lines of endeavor in exploiting their product, and have depended too much upon the routine performance of subordinates. (3) Defective collaboration from central-station companies furnishing energy supply.

It is essential to secure for the electric vehicle, of either the passenger or commercial type, a consideration on utilitarian grounds. The total annual rail tonnage in this country is over a billion and a half, and it is safe to assume that at least one-third of the material transported finally reaches the principal cities and is carted at least twice over a distance of one mile. If electric vehicles were used to transport this tonnage, the electric load available to central stations would be enormous. It is generally conceded that the freight tonnage reaching cities is handled many times over, but assuming that it is simply handled once from the railway to business premises, and afterwards to the consumer, the one billion ton-miles, at an average consumption of five kilowatt-hours per ton-mile, would, at the four-cent rate, reach a total figure of $200,000,000 per annum. This equals very nearly the total gross income of all central stations now engaged in business in the United States. What the situation really needs is a much more serious recognition of the business features of the entire project. It should be taken in hand with purely selfish motives, and not because of a desire to render charitable assistance to the manufacturers, nor of good-fellowship in yielding to the persuasion of the associations pleading the cause.

George H. Kelly, of Cleveland, in opening the discussion, pointed out that there is a lack of knowledge of what the electric vehicle is and will do. A comprehensive educational plan is needed before the electric will come into its own, and in this the co-operation of all interests is necessary.

W. P. Kennedy presented statistics showing that the average price paid for an electric vehicle is $2,600, and the average income of the central station for energy to charge is 10 per cent of the initial cost. In ten years, therefore, the central station's income for battery charging would be equal to the initial cost of the car. This should be an indication of the desirability for central-station co-operation.

A paper entitled "European Development of the Electric Vehicle Industry" was then presented by P. D. Wagoner. This paper presents some historical data showing the points of development in the electric vehicle in Europe, and in this country. It is pointed out that there are today approximately 3,200 electric vehicles in the whole of Europe. Approximately 25 per cent of the electric passenger cars in England are of American manufacture, as are also 10 per cent of those in France. The number of commercial electric exported to Europe is, however, almost negligible. The development of the commercial electric vehicle in Europe has been along highly specialized lines, such as taxi-cabs, municipal apparatus, postal vehicles, etc. The general utility truck is almost unknown. The industry in Europe is suffering to a much greater extent through early failures than is true in this country. Mr. Wagoner presents some detailed data on the number of vehicles in the various large cities, and the services which they perform. The paper is illustrated with photographs of early types and of installations at present in service.

A paper by George S. Walker, chief mechanician of the Philadelphia Fire Department, entitled "Electric Fire Apparatus" was then presented by the author. This paper chronicles Chief Walker's personal experiences in the equipping of a steam engine and a hose cart with battery-driven tractors, and of the results that have been obtained. It is pointed out that in numerous tests conducted to compare these motor-driven equipments with horse driven, the electric has demonstrated its superiority in a convincing manner. Mr. Walker sums up the advantages of the electric equipment as follows: As to reliability, the electric apparatus has never yet failed to respond to an alarm, which is not true of either the horse-drawn or gasoline equipment. The Philadelphia department has also found that the electric tractor eliminates the offensive odors of horses and also of gasoline and oil, reduces the element of fire, which is characteristic of gasoline equipment, and is much easier to keep clean and in good appearance. He points out further that the battery tractor has the advantage of gasoline apparatus in answering alarms, due to the fact that it is simply necessary for the driver to get on the seat, throw on his controller, and is under headway in less time than is ordinarily taken to crank the motor. It also eliminates the characteristic ignition and carburetor troubles in starting the motor in cold weather, and the attendant radiator troubles of freezing and leaking.

Various Philadelphia delegates collaborated the data presented by Chief Walker, pointing out specific instances in which the electric apparatus demonstrated its superiority.

P. T. Miller, of Springfield, Mass., presented figures showing the greater economy of the electric apparatus. A hook and ladder equipment, drawn by horses, responding to 107 alarms, cost the Springfield department $624.24, as compared with a similar equipment, motor-driven, responding to 148 alarms, which cost $280; and an electric hose cart, responding to 83 alarms cost $407.90 to operate, as compared with $680 for a horse-drawn cart responding to 192 alarms. Following this discussion, a demonstration of the equipment described in the paper was made at the respective stations.

Tuesday Morning.

At the session on Tuesday morning, W. A. Manwarring, of Philadelphia, presented a paper entitled "Power Wagon Operation and Central-Station Service." This paper commented on the transportation problems confronting the average central-station company, and discussed briefly the manner in which such problems are handled. The nature of the work which central stations are called upon to handle is very diversified, necessitating the maintenance of vehicles capable of conveying small articles, weighing from one to two pounds, and large pieces of apparatus weighing from ten to twenty tons. There are a great many questions which must be considered in the successful operation of power wagons, but the most important are the conditions under which they are called upon to operate. The work performed by the various classes of vehicles may

be classified as follows: Incandescent-lamp deliveries; arc-lamp deliveries; meter deliveries; distribution and high-tension work; underground work; emergency and trouble work, and general work.

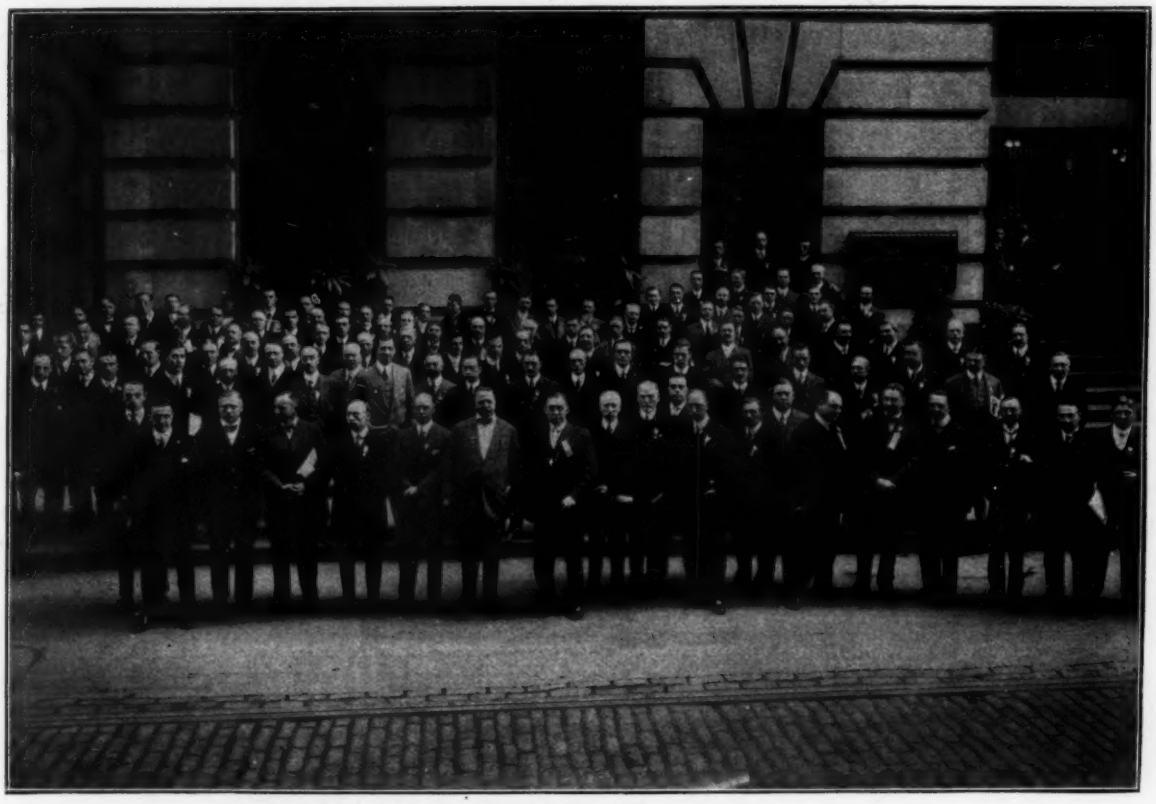
Vehicles used for incandescent-lamp delivery are generally of 1,000 pounds capacity or less, usually with a specially constructed body. Such vehicles are constantly in touch with the consumer, and if attractive in appearance have considerable advertising value. The vehicles used for arc-lamp delivery are generally of one ton capacity, and are fitted up specially for this purpose only. Such trucks must be capable of giving a large mileage, as they are called upon to cover a long distance. For meter delivery 1,000-pound rigs are usually provided, also with special carrying compartments. Vehicles for distribution and high-tension work are generally from one to three tons capacity and are equipped to facilitate the handling of all material and tools which may be required. For underground work the rigs generally employed consist of large trucks equipped with a winch, specially arranged for the pulling of cable. Such vehicles have been an important factor in central-station work, effecting considerable saving. In some cases, these vehicles are also equipped with motor-driven centrifugal pumps. The paper points out the varying service required of general haulage vehicles in central-station service, and illustrates and describes a number of these that are in use by the Philadelphia Electric Company.

In summarizing the advantages of the electric vehicle, Mr. Manwarring states that it is difficult for the transportation department in central stations to show a book profit when comparing power to horse-drawn vehicles. The advantage in any power wagon lies in its ability to cover the required distance between jobs with all possible speed, and to deliver material with a minimum amount of delay. He also recommends that central-station companies using power wagons adopt a standard set of forms and keep the performance and maintenance of their trucks in such a way that the transportation costs can be compared.

John F. Gilchrist, in discussing this paper, pointed out that the repairing and painting items are important. The experience of the Commonwealth Edison Company is that almost 20 per cent of its entire vehicles are constantly in the paint or repair departments. In order to reduce the time for painting, special drying ovens were installed in the paint shop, but not much time was saved. The company endeavors to paint each rig twice each year, so that they will always be of attractive appearance.

S. G. Thompson stated that battery charging was destined to become the greatest load for the central station, and to encourage this business central-station companies should not endeavor to figure a saving on transportation costs, but should be well satisfied to do the work for the same money when using the electric vehicles.

Following this discussion an address was delivered by T. I. Jones, of Brooklyn, entitled "A Wider Dissemination of Electric Vehicle Information." Mr. Jones pointed out that the vehicle manufacturers, battery manufacturers, accessory manufacturers and central stations, are all equally responsible for the dissemination of electric-vehicle information. The best way of advertising the electric vehicle is by word of mouth. At present less than three per cent of the total vehicle registrations are electrics. The commercial vehicle has made rapid advances, and the manufacturers are accomplishing a good work, but difficulty has been experienced in persuading them to demonstrate their cars. Considering the passenger vehicle next, Mr. Jones thought that the present price was too high. Of the automobiles registered up to July 1, 1914, Mr. Jones stated



Group at Convention of Electric Vehicle Association of America.

that the individual cost of 70 per cent of the gasoline cars was less than $2,000, while the cost of 85 per cent of the electric cars was in excess of that amount. He thought that the industry needs a car capable of going 50 miles on a charge that would sell at a price in the neighborhood of $700.

Regarding batteries, Mr. Jones stated that the present battery capacity is too limited. The tendency of the battery manufacturers has been to greatly improve the mechanical details without regard to chemical research. On the other hand, motors and tires are highly developed. Regarding the central station's position in the development of the electric vehicle, Mr. Jones stated that charging rates now average from four to five cents for private users, and two to four cents for garages. In Brooklyn, the practice of the central station is to provide car owners with identification cards, which, when presented to a garage at which a boost is desired, permits the cost of such service to be added to the consumer's bill at the home garage. Charging plugs have also been located in lamp posts, in front of contractors' stores and this has stimulated electric vehicle use.

Mr. Jones referred to the electrical salesman's hand-book, issued by the Commercial Section of the National Electric Light Association, which contains numerous chapters on electric vehicles, and data for the use of central-station salesmen. It is the aim to supplement this data from time to time with operating costs and other information relative to the use of the electric car.

In opening the discussion, C. D. Marsh, of New York, stated that if the price of the passenger car was reduced, the mileage must necessarily be reduced, which is contrary to the present tendency towards greater battery capacity and higher speed. In the manufacture of electric vehicles, greater care must be taken to avoid friction than in the gasoline cars, and better materials are necessarily used. This all means greater cost.

G. H. Kelly thought there would be no field for a $700 car, because of its necessarily limited battery capacity. Regarding demonstrations, he stated that vehicle manufacturers have found by experience that demonstrations pay only when an agreement is entered into between the manufacturer and the prospective purchaser that if the demonstration is satisfactory the car will be purchased.

F. A. Whitten, of Pontiac, stated that in 1912 his company made approximately 300 demonstrations, and 91 per cent of the prospective customers asking for such demonstrations did not subsequently purchase. Later it was decided to give a demonstration provided the applicant was willing to pay for it. On this basis there were 80 demonstrations made and 90 per cent of the prospective customers bought cars. Recently the company has entirely abandoned demonstrating, and the best results have been obtained.

F. S. Seelman, of Brooklyn, spoke of the vehicle data in the salesman's hand book, and emphasized the need for the co-operation of vehicle interests in adding to this work.

S. G. Thompson, of Newark, speaking of the low-priced electric, stated that by creating the impression that such a car would soon be available, is harmful to the industry. The duty of the central stations should be to sell the car which is now on the market.

W. H. Blood, Jr., of Newark, recited his experiences in personally constructing two electric vehicles. In 1893 an electric runabout was constructed at a cost of only $1,200. Another car was constructed ten years ago at a cost of $1,800. This car at present averages from 20 to 25 miles per day. He saw no reason why, with improved facilities, a low priced car could not be produced now.

A paper by George H. Kelly, entitled "The Cost of Electric Vehicles," was then presented by the author. Mr. Kelly points out that the total electric vehicle sales are comparatively small, and in addition the demand fluctuates from month to month to such an extent that it is impossible for the manufacturer to anticipate his production. For these reasons it is difficult to produce a low-priced car, although Mr. Kelly stated that passenger cars made to sell from $1,200 to $2,000 have never been a success. He stated that, contrary to the popular impression, the actual cost of selling electric cars was about half of that for selling gas cars, so that the reasons for the high price of the electric passenger cars were due to the high grade of material used and the expert workmanship necessary.

To create a demand for electrics which would result in the reduction of price, it is necessary to inaugurate an extensive advertising campaign in which all factors interested in the electric vehicle must participate. Such education campaign which would advise the public what the electric is, and what it can do, would do more to reduce the price of the electric than any other item.

In opening the discussion, Frank W. Smith stated that in his opinion fully 90 per cent of the requirements of transportation can be met successfully by the electric vehicle. He thought that every central station should employ electric vehicles for carrying passengers as well as merchandise, and certainly those men engaged in selling electrical devices should use an electric car.

J. W. Brennan, of Detroit, stated that gasoline passenger cars were used by the Detroit Company because of the personal preference of the employees for the gasoline automobile, but principally because of the low price of the latter. The commercial vehicles used by the company are all of the electric type.

W. A. Donkin, of Pittsburgh, stated that the electric vehicle has been found more economical than either the horse-drawn or gasoline rig by the Pittsburgh Company and greater development may be looked for in the Pittsburgh district.

J. H. McGraw, of New York, stated that the manufacturer is entitled to a large share of the credit for the successful development of the electric vehicle. He also thought that it is the duty of the central-station companies to provide their employees with electric vehicles, rather than with the gasoline automobile.

F. A. Whitten, of Pontiac, referring particularly to the statement made by Mr. Brennan regarding the prejudice of employees against the electric, stated that the same situation was encountered in his company, which manufacturers both gasoline and electric cars. As a result of proper education, however, the prejudice was soon converted to a preference for the electric.

The report of the Committee on Educational Courses, of which M. W. Alexander is chairman, was read by Secretary Marshall. This report chronicles the progress made by the Committee in having electric-vehicle courses established in several of the educational institutions of the country. It is suggested that this work be furthered by the employment of competent lecturers who can visit the various schools and assemblies for the purpose of creating a wider and more intelligent public interest in the electric vehicle.

A paper entitled "Educating the Public in the Field and the Use of the Electric Vehicle" was then presented by F. C. Henderschott. This paper presents a plan for reaching the public, and advising prospective purchasers of the advantages of the electric vehicle. It is suggested that printed matter, such as booklets, charts, etc., should be sent to a list of prospective customers, with the view of interesting the prospect and creating a desire. Such printed matter should be supplemented by personal letters and other forms of communication.

A carefully trained force of salesmen should quickly and effectively follow up every inquiry which is received.

Women demonstrators should be employed to demonstrate passenger cars to prospective users. It is suggested that careful use should be made of electric vehicles in the community in which the educational campaign is made. Educational campaigns should not be spasmodic, but should be inaugurated at proper seasons and vigorously and constructively carried on.

The report of the Committee on Operating Records was then presented by W. T. Kennedy.

The report of the Committee on Central Station Co-operation, of which W. W. Freeman is chairman, was presented by John F. Gilchrist. Following Mr. Gilchrist's presentation, J. W. Wakeman, of the Society for Electrical Development, made a brief address calling attention to the co-operation which the society is willing to extend to electrical-vehicle interests. Mr. Wakeman offered the services of competent men for committee work in this connection. He called attention briefly to the growth of the society and the work which it is undertaking.

A paper by H. P. Dodge, entitled "Constant Potential Systems for Charging for Motor Generators," was then presented. This paper describes a specific installation in a St. Louis garage, the equipment comprising two 35-kilowatt shunt-wound generators, operated by three-phase, 60-cycle, alternating-current motors. In connection with each generator, a Tirril regulator was installed, equipped with one main contact and two relay contacts. Each motor-generator set is installed independent of the other, but the switchboard provides means of throwing any charging plug on to either generator set, and an Allan-Bradley rheostat is connected with each circuit. The paper comments on the performance of this equipment and presents various curves showing results attained.

A paper entitled "The Trend of the Electric Vehicle Manufacture" was then presented by H. H. Doering. Mr. Doering points out that the time of cheap electric vehicles has come and gone. Today manufacturers are simply fulfilling the demand of the public, which is for the heavy, luxurious car, equipped with a battery of ample capacity and high speed. The quality of the present car sets the price, and while this may seem high, it must be understood that the electric, unlike the gas car, is not a one season proposition, but many cars are in service three to ten years. Mr. Doering pointed out that the largest manufacturer of electric passenger cars has an output of less than 1,500 cars, and the six next largest manufacturers have an output each of less than 1,000 cars. With this limited output, he said that it is, of course, impossible to lower the price.

J. P. Bartlett, of Philadelphia, in opening the discussion, made a plea for standardization in passenger-car manufacture. He claimed that at present there is no definite basis for judging the relative merits of cars, and many purchasers, judging a car on appearance alone, are often disappointed.

C. D. Marsh, of New York, inquired in what way the cheap electric vehicle mentioned had failed. Mr. Doering replied that battery capacity was insufficient, speed too low, appearance objectionable, etc.

A paper was then presented by Robert B. Grove, entitled "Electric Vehicle Performance in Central-Station Service." This paper deals particularly with the experiences of the United Electric Light & Power Company, of New York, giving details as to the performance of the various vehicles used by this company. Service conditions are mentioned, the equipment described in detail, and a description of garage facilities given. The paper is illustrated with views of various vehicles used by the company, and contains a complete report of the operation of the various cars used, covering the total expense of each car per mile traveled.

Wednesday Morning.

The report of the Standardization Committee was presented by E. R. Whitney at the session on Wednesday morning. This Committee reports the co-operation with the Society of Automobile Engineers, as a result of which numerous sub-committees have been appointed to consider various phases of electric vehicle standards. The Committee further reported that the charging plugs adopted as standard at the last convention have been formally adopted as standard by the Society of Automobile Engineers, The American Institute of Electrical Engineers, and the Incorporated Municipal Electrical Association of England. The standard data sheet of the National Electric Light Association was unanimously adopted.

In discussing this report, J. W. Brennan, of Detroit, thought that the standardization of car wiring should receive consideration from the Committee, as it is important to know what the safe maximum carrying capacity of the wiring is when batteries are receiving a boost charge.

R. E. Russell, of Schenectady, advocated uniform rules governing the installation of charging apparatus.

In concluding the discussion, Mr. Whitney pointed out that the Underwriters' Laboratories had expressed their views on car wiring which had been transmitted to the car manufacturers.

The report of the Traffic Committee, of which D. C. Fenner is chairman, was then presented by Harvey Robinson. Following this, a paper entitled "Electric Automobile Motor" was presented by H. S. Baldwin. This is a comprehensive paper, divided into two parts, dealing with the early electric vehicle and its effect on motor design; and with the design and performance of the present electric vehicle motors. It is pointed out that the electric vehicle of today requires a highly specialized motor to insure the maximum efficiency in the use of current at all times and under all conditions. The motor of today is slightly heavier than some of the earlier motors and lighter than many of the later ones. It has better electrical and mechanical characteristics than ever before, and provides sparkless commutation and high efficiency at all loads, with great overload capacity and the maximum of torque per ampere. The paper discusses the electrical rating and characteristics of motors and recent mechanical designs, these points being illustrated by stereopticon slides showing the various parts and performance curves.

In discussing this paper, F. N. Kimball, of Boston, pointed out that no vehicle should be recommended or sold unless it is certain that the vehicle will meet all conditions that will be imposed on it. He thought that there is a sufficiently large field so that no efforts should be made to place electric vehicles where they cannot perform satisfactorily. Mr. Kimball thought that there is a field for a moderate price commercial car at the present time, and that later there will be a demand for a low-price passenger car. He thought the greatest factor influencing the development of the electric is the co-operation locally of all interests.

Charles A. Ward, of New York, explained that it is possible for the high grade commercial car to be made at a price within reach of all merchants. This is borne out by the development of a low price car by his company, which was exhibited at the New York show.

Day Baker, of Boston, thought that the data presented by Mr. Baldwin should be studied by electric vehicle salesmen, so that they may have a better understanding of vehicle performance.

A paper by T. H. Schoepf, entitled "Effects From the Utilization of the Kinetic Energy of an Electric Vehicle" was then presented. This paper points out that to attain greater mileage and higher speed for electric vehicles, it is necessary to increase both the number of cells and the capacity of the battery. The number of cells is determined by the

available charging voltage and the maximum is now used in all vehicles. The capacity is determined by the limitations of vehicle space and weight, both of which are approached closely in present-day practice. The simplest equivalent is therefore frequent boosting, which is limited, due to lack of properly equipped stations. Boosting the charge of the storage battery during the time the truck is standing at the loading station is sound in principle and economical, which, augmented by charging when the truck is under way, approaches the ideal. The latter means the utilization of the energy stored in the vehicle by virtue of its weight and speed. It is pointed out that regeneration has been more or less discredited, because shunt-wound, or at best compound-wound, motors were used in the past, thereby sacrificing the desired characteristics of a series-wound motor to obtain the characteristics of a shunt-wound machine when regenerating. Furthermore, regeneration was used to bring the vehicle to a standstill, which resulted in abuse and injury to electrical equipment and transmission system. The paper presents data on the tests conducted on a standard truck, with the addition of three cells of storage battery connected in parallel circuit with the fields of the normal series motor when regenerating, and a slight modification of the contacts on the controller drum. The author advocates this practice, for which he claims increase in car-miles per charge of battery, increase in average volts across the battery terminals, and increase in average running speed. All of these advantages, he states, may be secured by the addition of one or two contacts to any standard controller, and two or three cells of storage battery to any standard truck now in service.

Following this paper the election of officers took place, which resulted as follows:

President, John F. Gilchrist, Chicago.

Vice-president, Walter H. Johnson, Philadelphia.

Treasurer, H. M. Edwards, New York City.

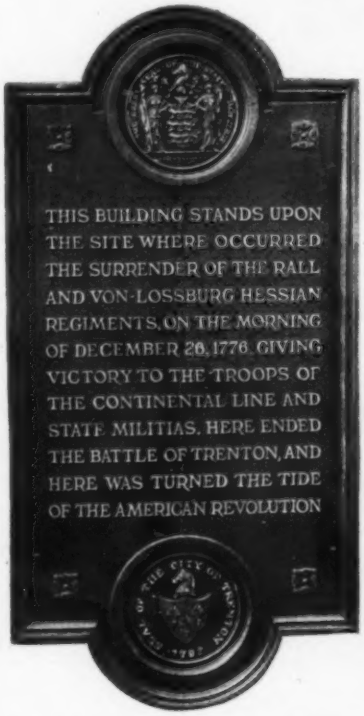
Directors, Frank W. Simth, New York; Charles Blizard, Philadelphia; E. P. Chalfant, Chicago, and J. H. McGraw, New York.

Wednesday Afternoon.

At the concluding session on Wednesday afternoon, a paper entitled "Calculations of Electric Motor Characteristics and Production of Electric Vehicle Performance" was presented by A. A. Nims. Following this J. C. Lincoln presented a paper entitled "Charging Apparatus for the Private Garage," which deals with the Lincoln electric battery-charging outfit, comprising a motor-generator set and a steel cabinet in which is mounted a knife switch with a number of special jaws for complete control of the apparatus.

This was followed by a symposium entitled "The Electric Industrial Truck," which was contributed to by the Automatic Transportation Company, the Elwell-Parker Electric Company, the General Vehicle Company, and C. W. Hunt Company, Inc. The products of each of these companies were described and illustrated by means of stereopticon views.

On Monday evening a session was held, to which the ladies were specially invited. A report of the Insurance Committee was first presented by Day Baker, chairman. Following this, J. Crawford Bartlett, of Philadelphia, delivered a brief address entitled "An Answer to Dr. Steinmetz." Mr. Bartlett pointed out that there was not a demand for a cheap electric passenger car, because the production of such a vehicle meant cheap appearance, low battery capacity, and troubles of various kinds. He stated that the manufacturers are today building the car which the public demands, and at a price which the public is willing to pay.


THIS BUILDING STANDS UPON
THE SITE WHERE OCCURRED
THE SURRENDER OF THE RALL
AND VON-LOSSBURG HESSIAN
REGIMENTS, ON THE MORNING
OF DECEMBER 26, 1776, GIVING
VICTORY TO THE TROOPS OF
THE CONTINENTAL LINE AND
STATE MILITIAS. HERE ENDED
THE BATTLE OF TRENTON, AND
HERE WAS TURNED THE TIDE
OF THE AMERICAN REVOLUTION

Tablet on Trenton Telephone Building.

A very interesting illustrated lecture was then presented by F. Nelson Carle, dealing with special applications of electric trucks, without reference to any one company's product. Following this a moving picture, entitled "Selling Electric Vehicles," was produced.

Transcanadian Highway.

An automobile highway corresponding to the Lincoln highway in this country, is now being built clear across Canada from the Atlantic to the Pacific.

Historic Tablet for Telephone Company.

The new telephone building of the Delaware & Atlantic Telegraph & Telephone Company on East State Street, Trenton, N. J., now nearing completion, rests upon ground of particular historic interest, being the site of a revolutionary battle in 1776.

To properly commemorate this location, the company has been active in the preparation of a suitable marker. This has taken the form of a distinctive bronze tablet of oblong shape, incorporating the seal of the state of New Jersey at the top and that of the city of Trenton at the bottom, as shown in the accompanying reproduction. This tablet was designed by the late Francis B. Lee, historian, and carries the following inscription:

"This building stands upon the site where occurred the surrender of the Rall and Von-Lossburg Hessian Regiments, on the morning of December 26, 1776, giving victory to the troops of the Continental line and state militias. Here ended the battle of Trenton, and here was turned the tide of the American Revolution."

The investigations of Mr. Lee and District Manager C. R. Fairchild, have brought to light that at the time of this battle the property was an apple orchard; the Hessians had advanced from Assanpink Creek and met defeat here. Beyond this tablet, a cannon ball found on this same location will be placed on permanent exhibition, in a glass case, in the company's offices.

The Delaware & Atlantic Company is a subsidiary of the Bell Telephone System. The new Trenton exchange building will represent an investment of about $125,000, while a similar amount is to be expended upon equipment.

Canton Agitating Municipal Plant.

A movement is under foot in Canton, O., contemplating the submission to a vote of a bond issue of $300,000 for the construction of a municipal lighting plant. Those behind the plan desire to get the issue adopted and the plant constructed before the expiration of the city's present contract with the Canton Electric Company, on February 15, 1916. The contract provides for the payment to the company of $42,000 a year.

Underground Cables at Panama.

The main telegraph, telephone and railway-signal cables in the Canal Zone are being placed in an underground conduit system stretching entirely across the isthmus and adjoining the Panama Canal and Panama Railroad. Branches will be built from the main conduit to the most important points.

Illumination of Festival Hall at Panama - Pacific International Exposition.

Great advancement in the science of artificial lighting has been made by the department of illumination of the Panama-Pacific Exposition in planning an extensive and practical system of indirect lighting to meet the various requirements and physical conditions in grounds and buildings. The scheme adopted for illuminating Festival Hall is a unique method of flood lighting by indirect application, originating with the chief of the department. Much of the experimental engineering essential to working out this scheme of illumination was along the lines of pure pioneering in the science of electric lighting.

The lighting of the various exposition buildings has presented numerous and devious problems. Many unique devices have been employed to illuminate effectively and yet in a manner that will command most favorable attention. To develop a subdued light that will be restful to the eye and still of sufficient strength and effectiveness in all essentials, has been a difficult task. This has been accomplished in the design adopted for lighting Festival Hall, in a degree surprising even to engineers of long practice.

Festival Hall has a seating capacity of 3,000. It is to be used for festivals and concerts, and will be almost continuously occupied during the exposition. The architecture is of French theater design. The auditorium is covered by an immense dome.

A pit, 21 feet square and 12 feet deep, has been constructed under the center of the auditorium floor. In this pit there are installed ten 18-inch searchlights of enormous power. It would have been relatively simple to arrange the searchlights had there been no obstructions, but the presence of a brick subway essential to the building, situated in the center of the pit, made it necessary to arrange mirrors to redirect the light from six of the searchlights by reflection into a diffusing disk. The mirrors are placed on either side near the top of the brick subway at an angle necessary to secure the proper reflection. The four other searchlights are so situated that they throw their rays directly into the disk.

The diffusing disk is formed of plate glass, one-quarter inch thick and sand-blasted on the under side. The plate of glass is set in a circular aperture six feet in diameter, forming a collar to the pit. The rays of light from the searchlights are collected in this disk and directly diffused through the auditorium. The dome, being painted a light color, acts as a reflector, and thus aids effectively in diffusing the light. That is, while the whole interior will be thoroughly lighted, it will be no more evident to a person sitting adjacent, as to the source of illumination than to a person at a distance, unless one is looking downward into the disk. The disk is surrounded by a parapet wall about four feet high and it is so set in the aperture that light will be directed from its surface to every portion of the dome. Conical mirrors are also set around and above the disk to catch any stray rays of light. By using colored screens over the lenses of the searchlights vari-colored lighting effects may be easily secured.

Each of the searchlights is of about 6,000,000 candlepower. An enormous element of heat is necessarily generated and a blast of cold air from the ventilating system will circulate throughout the pit, passing out above. A stream of water constantly running over the lens of each of the searchlights aids in the cooling. The diffusing disk will be cooled sufficiently by air circulation.

While the general lighting of the auditorium is entirely taken care of by this method, suspended fixtures are also used in some of the alcoves. The balconies and foyer are lighted by such fixtures.

The footlights on the stage consist of 210 clear lamps and 70 each of amber, blue and red, with a 100-step dimming attachment. A complete portable system is provided by sixteen 300-watt stage pockets. The conference rooms and offices are lighted by small semi-indirect units made from staff.

Relief lighting for the cupola above the main dome is accomplished by installing 250-watt units on each story, placed one foot above the floor. The relief lighting for the pavilion towers has eight 250-watt units placed in the upper portion of each. The total connected load, exclusive of motors, amounts to 106 kilowatts.

The construction of an auditorium along conventional lines, lighted by ordinary electrical methods with conventional fixtures and appliances, would have been a comparatively easy task from an engineering viewpoint. Visitors would have been impressed merely with the vastness of the undertaking in accord with the colossal scale of all the architectural construction of the exposition. But originality has been the keynote of the Panama-Pacific Exposition.

To have illuminated so great an area on ordinary lines, would require a large number of lamps, either suspended or fixed, occupying a considerable portion of space and furnishing imperfect illumination in many details. To make it possible to secure an entirely unobstructed view of the interior of the auditorium from any portion and to be able to look upon the magnificent dome of Festival Hall free from any disfigurement is a distinct achievement which will make this grand auditorium one of the wonders of the exposition.

How To Get A Job.

Very often a good man is deprived of the opportunity of connecting with a good job because of his inability to make the right approach. It isn't always easy to bring to the attention of those requiring one's services abilities and qualifications, the possession of which might result in establishing a continuous record of success. *Associated Advertising,* the official organ of the Associated Advertising Clubs of the World, contains from time to time a great many good ideas. It is from the issue of that publication of September, 1914, that the following suggestion has been secured. Whether it is in the electrical industry or any other industry that the position is desired, the suggestion made by Mr. Dibble is well worthy of a trial.

HOW TO GET A JOB.

By Fred A. Dibble, Treasurer Harris-Dibble Company.

1. Make a list of the names of the firms for whom you are qualified to work.

2. Write a letter of application stating specifically what you are qualified to do by reason of—

   (1) Taste or natural inclination.
   (2) Education or general training.
   (3) Experience or special training.
   (4) Give references as to:
      (a) Where you have worked during your working life.
      (b) Character references.
      (c) Social references.

   Spend enough time in preparation of this letter to give your story essentially complete in fewest number of words.

3. Typewrite or have typed for you 1, 5, 10 or 20 copies of this letter each day until you have exhausted your list or have secured your job.

4. Put in the remainder of your time following up these letters and the answers they bring by personal calls. At the end of each interview, if your services are not needed, tactfully inquire if the person you are calling upon can suggest anyone who might need your services. Make a careful note of any suggestions or addresses and then follow up these also.

5. Require of yourself that you send out regularly each day the number of letters that you have set as your stint.

6. Advertise:

   (1) Place an advertisement in the Situation Wanted Department

of the trade and class papers touching the field you desire to enter.

(2) Use the daily papers if you can afford it.

(3) Answer ads which seem to fit your qualifications in all these papers.

7. Write to your old employers, frankly stating what you want to do. They may be able to help you with advice and suggestions.

8. Let as many people as possible know what you want to do. Believe all the time that everybody wants you to have a good job.

9. Take especial pains to keep up your personal appearance. Your person and clothes should receive extra care.

10. Keep up your spirits by belief in yourself, and carry an air of optimism and good-will toward everybody. And keep your eyes and ears open and your mind so fully occupied that you will have no time to become discouraged.

Outline of a Letter Which Is Designed to Tell Your Story Without Waste.

69 Blank Street
Upper Montclair, N. J.
September 1, 1914.

New York Publishing Company,
New York City.

Subject: Position as—

My Age: 29 years, January 13.

Appearance: Healthy, weight, 180 pounds, 6 feet tall, blond.

Taste: My natural tendency is to want to sell and trade.

Education: Attended district school until fourteen, then Troy High School, after which I had one year in Yale College.

Experience: Spent six months on excavating contract handling a gang of men. Was salesman on the road for two years for the Novelty Manufacturing Company. Was made assistant manager of my concern, which position I held for four years, but I must get outside, where I feel more at home.

References: Present employers, who are aware of my desire to make a change. Mr. Blank, for whom I worked while on the excavating job. I reside at Upper Montclair, N. J. My bank is the First National. My grocer's name is Henry Shaw, and my butcher's name is John James. My tailor's name is William Wise. All are of Upper Montclair. I belong to the Upper Montclair Country Club and to the Aldine Club of New York.

Remarks: I court the fullest investigation as to my ability and reliability. I think I should like to make a connection with your concern and kindly request an interview at your earliest convenience.

Yours very truly.

Military Wireless School at Kansas City.

Capt. R. D. Garrett, of Field Company "A," Signal Corps, National Guard of Missouri, has established a school for wireless operators and engineers in the company's armory, 3608 Main Street, Kansas City, Mo. Wireless equipment has been in use by this company for some time and for several years has been operated successfully during summer encampments. The present station equipment has been almost entirely constructed by the members of the company under the direction of Lieuts. F. C. Walden and E. T. Jones, who are in private life engineers, respectively, of the Bell Telephone Company and the Kansas Electric Light Company. The boys made an oscillation transformer, rotary spark gap, variable and fixed condensers, keys and switches and the complete aerial; a motor was also rewound.

Apparatus in School for Radio Operators.

At the armory, current from the local electric light wires is used; in the field there is used a 500-cycle generator which was furnished by the Government. The men are now planning a new form of generator for field use. The old one requires four men and develops only one-quarter kilowatt. The new one will give something for a mule to do; instead of a hand crank the generator is adapted for the application of a shaft bearing a singletree; the mule hitched to it may walk at the rate of three or four miles an hour and, through speed-increasing gearing, will develop one-half kilowatt and thus will enable the field station to send 180 miles.

The armory station now receives messages from Panama, Cuba, Alaska and from ships in the Gulf of Mexico and the oceans.

The wireless school has been running for two or three months, but its plan is being extended. Only practical instruction for prospective operators and engineers is given and there are no requirements as to admission, except an ambition to learn and a willingness to study. In mathematics enough algebra, geometry, trigonometry (including the use of logarithms) is given to enable the student to solve general electrical and mechanical problems. A short and practical course in mechanical drawing is also included. Advanced students have access to three classes a week.

The company contains some amateur electricians who are geniuses. Serg. T. G. Heironymus and Serg. Ben Riggin have made much of the equipment. Heironymus is a high-school boy 18 years old and has been working with wireless since he was 12 years old. This company is said to be one of the best equipped and most competent in all of the National Guards.

War and Copper.

Not a pound of copper was exported to Germany, Austria or Belgium in September. In August 4,198,000 pounds went to Germany. Since war began our exports of copper to Europe have declined approximately 76,000,000 pounds compared with last year.

The Electrical Precipitation of Smoke, Dust, Etc.

A. F. Nesbit discussed "The Electrical Precipitation of Smoke, Dust, Etc.," before a joint meeting of the Pittsburgh sections of the American Institute of Electrical Engineers and the American Electrochemical Society, at Thaw Hall, University of Pittsburgh, on September 22. The theory of electrical precipition was discussed at some length, the essential being the charging of the particles of solid matter electrostatically by causing the gases to pass through an intense static field. Conducting particles then become charged, and are driven away from the field of greatest intensity by the interaction between the charge and the static field. Other solid particles are also driven out, doubtless by collision with the charged particles.

The potential should be sufficient to cause corona—the visible sign of active ionization—but not enough to cause actual sparking. The actual potential required depends on the kind of gas, its temperature and the kind and amount of suspended solid matter. Use is made of this principle in certain smoke-indicating devices which have spark points placed in the flue. By suitably arranging the separation of the points and the potential, sparking results whenever a certain amount of smoke is produced. This can be indicated in the engine room, through suitable relays, by the ringing of a bell or the lighting of a lamp.

Precipitation can be secured with either alternating or direct current, but the latter is more efficient, and high-voltage, commutator-type rectifiers are used.

Practical demonstrations of smoke precipitation on a small scale were performed in the hall, and moving pictures were exhibited of precipitation on a commercial scale. The apparatus shown included two concentric rings of pipes five inches in diameter and four feet long through which the flue gases were passed. The discharge took place from No. 20 wires suspended concentrically in the pipes to the walls of the pipes. The smoke was effectually precipitated from gases passing through the pipes at a rate of five feet per second. With the five-inch pipes, a voltage of 34,000 to 36,000 volts is required when the furnaces are first started up and are comparatively cool. As the gases attain a higher temperature the required voltage drops to about 28,000 volts. The voltage must be decreased quickly to the correct value to prevent sparking or even arcing across. If the smoke is excessively hot, a thick tarry material collects on the central wire.

At the conclusion of the demonstration A. F. Meston showed lantern slides of commercial installations of dust-precipitation devices. These were mostly in cement or chemical works to precipitate dust or acid fumes rather than smoke. The big field for these installations is undoubtedly in the precipitation of smoke, but most of the early installations have been made to avoid litigation due to offensive or destructive fumes or dust.

Among other views was shown the first commercial installation in America, that installed in 1906 by Prof. F. G. Cottrell, of the University of California, at the DuPont Powder Works at Penole, Cal., for the precipitation of sulphuric acid fumes. From 100 to 200 cubic feet of gas was treated per minute with a consumption of about one-fifth kilowatt at 6,600 volts on the electrodes.

At the Selby Smelting Company's smelter, sulphuric acid fumes and arsenic and lead salts escaped from the stacks. The treaters were constructed from lead plates, and lead-covered iron rods with mica points for the discharge were used for the electrodes. The consumption, including the power for the synchronous motor driving the rectifier, was two kilowatts, and the discharge potential was 17,000 volts.

At the plant of the Riverside Portland Cement Company, Riverside, Cal., electrical precipitators were installed in 1910 as the result of suits brought against the company by neighboring orange growers. This company has ten kilns from which 700,000 cubic feet of gas issue per minute at 550 degrees centigrade. A precipitation chamber, measuring 13 feet wide by 18 feet high by 38 feet long is placed on each side of each kiln stack. The collecting electrodes are of screen made from No. 14 wire, reinforced by angle iron. The discharge electrodes are No. 20 soft-iron wire, placed one foot apart. The current is unidirectional with a mean value of 37,000 to 40,000 volts. The electrodes are tapped with an insulated hammer about once an hour to knock off the dust which collects on them. The power consumption is 3.5 to 4 kilowatts per treater, including all power for the motor-generator sets and the dust conveyor, about 40 kilowatts being required for the entire plant. Ninety tons of cement dust are collected from the ten outfits every 24 hours. The cleanup has been found to be over 97 per cent of the total dust present. Incidentally, the dust collected is rich in potash and has proven to form an excellent fertilizer for the orange trees which it formerly damaged. It is interesting to note that an exploring rod has shown that the gases leaving the precipitators at this plant retain a charge, whose potential is about 10,000 volts.

Slides were also shown, demonstrating that equally as good results can be secured with coal smoke, when there is any demand for it.

In the discussion T. R. Cook stated that smoke precipition should ordinarily not interest an engineer, who should, instead, study smoke prevention by scientific combustion. In some cases, however, this is impossible, and one of them is a railroad roundhouse in which green fires are continually being kindled in cold furnaces. The Pennsylvania Railroad has been quite successful in washing the smoke from the flue gases by forcing the smoke under water; by the use of water jets; and by the use of live steam. These washers are, however, clumsy and they deteriorate rapidly.

Chas. Fortescue stated that the first essential of precipitation is ionization of the gases. The rate of precipitation depends on the intensity of the static field beyond the corona edge. High voltages require expensive transformers and other apparatus. Hence efficiency requires a high field intensity and as short an electrical path as possible. This can be secured in practice by making a larger number of smaller chambers.

L. W. Chubb called attention to the fact that the exact field intensities required depend upon the nature of the gases. To properly precipitate various materials from different gases will require a great deal of experimental research. Excellent work has already been done in this line by Professors Strong, Nesbit and Cottrell, who have experimented with many of the more familiar gases.

Telephone Company Plans Ahead.

Despite the unrest caused by the European war and general business conditions the New York Telephone *Review* describes a large amount of development work in its monthly record of the more important improvements which keep ahead of the constantly increasing public demand for telephone service and are progressing consistently and systematically in every part of the company's territory.

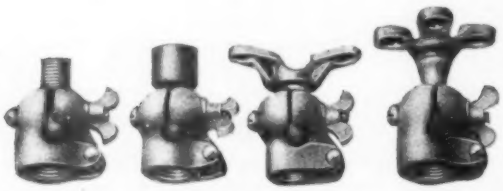
In the Farmingdale, L. I., district about 70 poles and 9,000 feet of cable will be placed to care for the telephone development expected in the next year or two. An expenditure of about $150,000 is being made on extensive additions to the plant in North Tonawanda and Martinsville, N. Y.

Cable work costing about $9,000 is about completed in Fanwood, N. J. In the Westwood district the net increase in telephones for seven months has exceeded the year's estimate, and more than $27,000 has been expended on plant work. Twelve thousand feet of underground and aerial cables will be placed in the South Orange district.

New Electrical and Mechanical Appliances

New Adjustable Hickey.

There are few jobs where the wireman or fixture hanger finds outlet boxes level, or studs or drops straight, or does not run into crooked threads which finally have the same result. To relieve these troubles of the past there has been developed a new adjustable ball-and-socket-joint hickey with an angle of possible correction sufficient to take care of a fixture 12 inches long that will be 4 inches off center, or a 6-foot fixture 24 inches out of plumb. By a slight cutting off of the corners of one side of the cup with a file or emery wheel the angle of pitch may even extend beyond 45 degrees. This is a feature very valuable when outlets occur on a sloping ceiling, such as is found with saw-tooth construction or under theater balconies, stairways, etc.



Several Forms of the Wico Adjustable Hickey.

This new device is known as the Wico Hangstrait Hickey. It is made of high-grade malleable iron and is of great mechanical strength, small, neat and compact, and so low in price that it can be fitted to all fixtures, not only to take care of trouble but to anticipate it. The hickey is furnished complete with a tripod, crow-foot or outlet-box stud or made to fit insulating joints, the bottom of which may be either male or female, one-quarter-inch or three-eighths-inch standard pipe size, and to connect to fixture stems of one-eighth-inch, one-quarter-inch or three-eighths-inch standard pipe size. The minimum overall length of this hickey with an insulating joint is less than one inch greater than the ordinary hickey and insulating joint.

Use of this device results in a time and labor saving, which, according to the manufacturer, produces a 10-per-cent to 50-per-cent reduction on the average cost of hanging electric fixtures. One man can handle any fixture not too heavy to lift. Long-arm, wide-spread fixtures are just as simply and easily hung as the plain-stem fixture, as there is no turning or twisting of the fixture necessary. After the crow-foot or insulating joint with the ball fitting has been attached, the fixture is hung by slipping the bolt through the hole in the ball, swinging up the hinged half of the cup or socket and screwing up the wing nut. The fixture hangs plumb and cannot twist or swing. A tightening of the wing nut leaves the joint rigid.

This hickey is made by the Wilton Manufacturing Company, Wrightsville, Pa.

Fig. 1.—Adapti Loom Clamp.

Adapti Loom Clamp.

A new clamp of very simple construction for securing flexible non-metallic conduit or "Loom" to switch boxes has been placed on the market. Fig. 1 shows the device, which is substantially made of a simple piece of sheet steel. Its application to an Adapti switch box is shown in Fig. 2. In those districts where loom clamps are required, these boxes are provided with a hole in the bottom to which the clamp can be quickly screwed. Similarly shaped boxes can be readily drilled to receive the clamping screw. The clamp holds very securely one, two, three or four loom conduits and these need not all be of the same size even.

These clamps have been approved by the Underwriters Laboratories. They are manufactured by the Adapti Manufacturing Company, Winter and Leonard Streets, Cleveland, O.

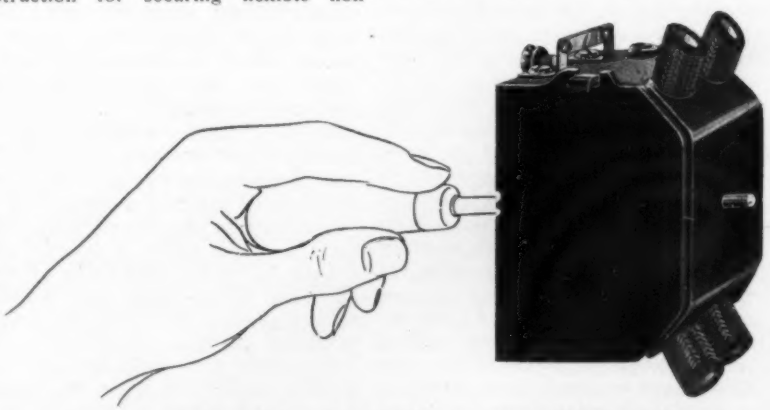


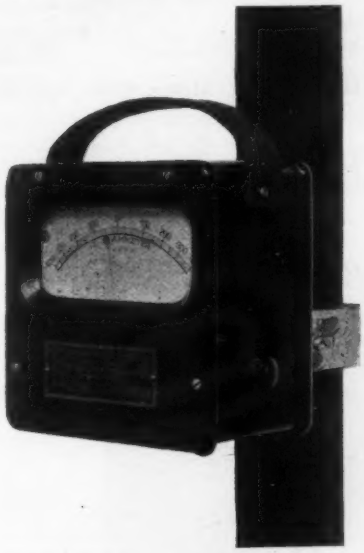
Fig. 2.—Simple Method of Fastening Loom Clamp to Switch Box.

Metropolitan Direct-Current Cable Testing Ammeter.

For some time there has been felt by central-station engineers need for an instrument for measuring the current in direct-current networks, loads on house or service wires, busbars, etc., where it is found to be inconvenient or impossible to open the conductor for the series connection made necessary by the ordinary ammeter. Such an instrument corresponds in direct-current measurement to the place held by the portable split-core current transformer and ammeter in alternating-current measurements. It is of special value in the supervision of networks where the distribution of load from feeding points and the balancing of the system have to be checked at frequent intervals. Measurements of this nature with ordinary instruments would be in many cases so expensive as to be

prohibitive and for this reason, in the majority of cases, these measurements, although desirable, are not made, the distribution being a matter of guesswork.

An instrument of ingenious design and construction to meet this very need has recently been placed on the market by the Metropolitan Engineering Company, 30 East Forty-second Street, New York City. It can measure the current in direct-current cables or other conductors without disturbing or open-circuiting them. This is done by removing the U-shaped iron strap on the back of the instrument, placing the conductor within its loop and reclamping the strap to the iron terminals, thus completing a magnetic circuit about the conductor. This is shown in the accompanying illustration. On closing the key of the instrument, it immediately reads the current in the conductor. The zero point on the scale is in the middle, so that reversal is unnecessary.



Direct-Current Cable-Testing Ammeter.

The principle of the instrument is the inverse of that of D'Arsonval instruments. Instead of having a stationary, permanent magnetic field and a variable current in the moving coil, the Metropolitan ammeter has a constant current in the moving coil and a stationary variable magnetic field. In other words, the permanent magnet is replaced by the detachable iron loop and the moving-coil circuit is energized by a small auxiliary battery. It will be readily seen that when the iron loop incloses a conductor carrying current, the flux in the magnetic circuit of the instrument will be proportional to the current flowing in that conductor and as the moving coil is independently energized by a current of constant value the deflections of the pointer on the scale will be proportional to the current flowing in the conductor.

The current taken by the moving coil is very small and is supplied from a dry cell with which the instrument is equipped. A simple method is used for checking the constancy of the current in the moving coil, which is only occasionally necessary. This is done by putting within the loop a conductor carrying a known current and making slight adjustment of the regulating resistance in series with the moving coil. It has been found that the instrument is substantially accurate for all conditions and sizes of conductors that can be inclosed in the iron loop, since the magnetic flux is practically confined to the iron.

By means of this cable-testing ammeter. it is possible to take current measurements both rapidly and with comparatively small expense. The instrument is very compact, weighing only 4.5 pounds. It is substantial, simple in design and may be handled, used and calibrated by the ordinary workman.

Delta Battery Table Lamp.

Delta Battery Table Lamp.

An ingenious electric table lamp, on which patents are now pending, has been placed on the market for use in places where standard lighting current from central-station lines is not available. The new outfit comprises a neat and firm upright attached to a wide decorated base. Silk lamp cord runs through the upright and base to a battery box in which are four dry cells. A small six-volt tungsten lamp is used with a reflector that is adjustable in various directions. The position of the lamp can be shifted up and down along the upright. Although but a small lamp is used, its combination with the reflector is so effective as to make the outfit serviceable for reading, shaving and for general purposes where a semi-portable lamp is needed. It is possible to use it even for illuminating a moderate-sized room.

Owing to the efficiency of the lamp, it will burn from 200 to 300 hours on a set of dry cells, according to the statements of the makers. All features of the outfit have been carefully designed and worked out. The outfit is manufactured by the Delta Electric Company, Marion, Ind., which company is well known for its efficient Delta electric hand and other lamps.

Electric Sign Withstands Bombardment.

One of the interesting illustrations which have been reproduced recently showing the damage caused by the use of modern big guns and shell fire, appeared in the Chicago *Examiner* of October 13. Of particular interest to electrical men is the electric sign which appears in the foreground, and is apparently the only thing that was not destroyed. This, we are told, is a sign made by the Federal Sign System (Electric) of Chicago, Ill.

Rugged Electric Sign Survives Bombardment.

Allen-Bradley Starting Rheostats for Direct-Current Motors of Large Capacity.

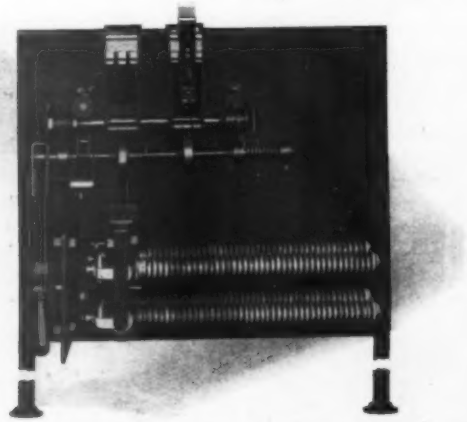
In the accompanying illustrations is shown the new type of resistance starters for direct-current motors of 150 horsepower and over, recently put on the market by the Allen-Bradley Company, Milwaukee, Wis. The design incorporates the graphite compression-type resistance, by means of which an absolutely smooth and even acceleration of the motor is obtained without the flashing and burning which is frequently noticed with wire-wound or grid-type resistance.

According to the manufacturers' claim, the resistance units embodied in this starter cannot break, do not burn out, are not affected by moisture or corrosive fumes, and in fact, are practically indestructible. The same also greatly simplify the apparatus, as there are no bulky resistance grids to contend with and the intricate wiring entailed by the same is eliminated. All operating parts are in full view and readily accessible, as may be seen from the cuts. There is nothing on the back of the starter but the necessary bus-bars and line and motor connections.

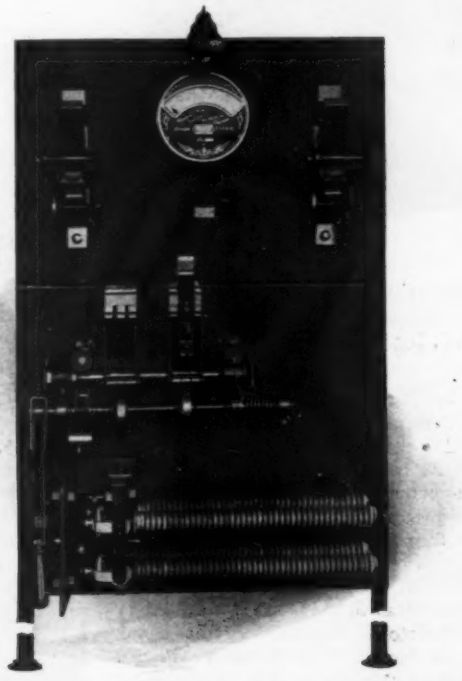
The new motor starter has only one operating lever, which is an improvement over the multiple-switch starter, as it reduces the number of operating parts, which are sources of trouble, and furthermore does not accelerate the motor in a fixed number of steps, but starts the same with a gradually increased flow of current. This operating lever successively actuates two clapper switches by means of a cam arrangement, one of which closes the motor circuit while the other shunts the resistance units out of the circuit after the same have been fully compressed. The first clapper switch is provided with auxiliary graphite arcing contacts. An automatic no-voltage release is furnished on the standard starters with its operating magnet ordinarily connected in series with the shunt motor field. The starters can be equipped with an overload release mechanism which is very positive in its operation.

The standard motor-starting panels can also be furnished with field rheostats to increase the speed of the motor to any desired extent. These field rheostats are not equipped with a no-voltage release, but are provided with a relay system which short-circuits the field rheostat during the starting period in order to give the motor the full strength of the field to start with.

Special panels with knife switches, voltmeters, ammeters, circuit-breakers and other apparatus mounted together on the panel with the motor starter can be furnished. The second illustration shows one of the many forms of these special starters.



Compression-Type Starting Rheostat for Direct-Current Motors.



Special Motor-Starting Panel With Ammeter and Circuit-Breakers.

Air-Brake Story Prizes.

The committee of three judges, consisting of W. E. Symons, mechanical engineer, Chicago, Ill., Willard A. Smith, president and manager, *Railway Review*, Chicago, Ill., and R. V. Wright, managing editor, *Railway Age Gazette*, New York, N. Y., in whose hands the Westinghouse Air Brake Company placed the decision as to the merits of the stories submitted in the Air Brake Story Contest recently conducted by it, has just rendered its report, which shows prize winners as follows:

First prize, $1,000—James Cain, engineer, Wabash Railroad, Peru, Ind.

Second prize, $500—H. C. Woodbridge, general manager's special representative, Buffalo, Rochester & Pittsburgh Railroad, Rochester, N. Y.

Third prize, $200—Alex M. Stewart, engineer, Illinois Central Railroad, McComb, Miss.

Fourth prize, $150—D. Oxenford, road foreman of engines, Lehigh Valley Railroad, New York, N. Y.

Fifth prize, $100—Carl H. Fuller, chief engineer, Macon Railway & Light Compay, Macon, Ga.

Sixth prize, $50—Millard F. Cox, assistant superintendent of machinery, Louisville & Nashville Railroad, Louisville, Ky.

Gas-Electric Motor Cars for Illinois Central Railroad.

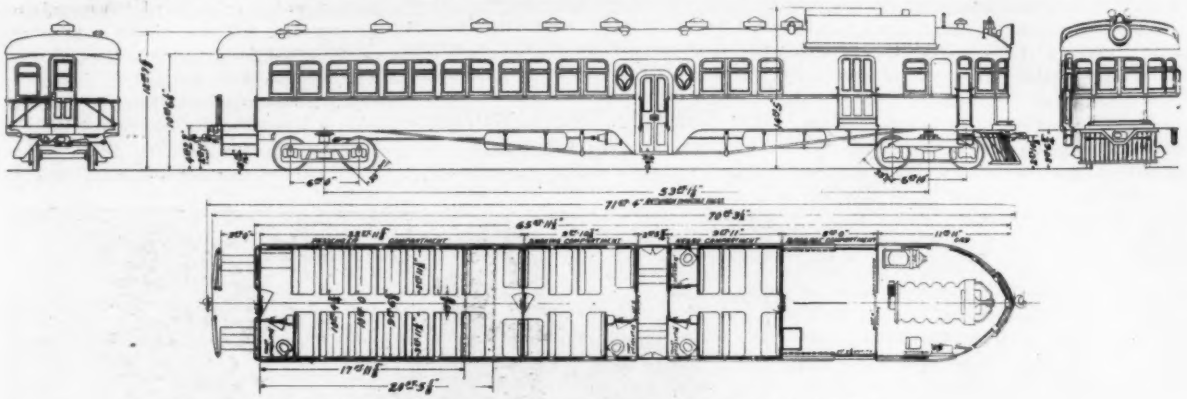
The Illinois Central Railroad Company, Chicago, Ill., has recently contracted with the General Electric Company for four gas-electric motor cars, which will be placed in commission for supplementary service on some of the connecting lines of the company. The railway company is canvassing the branch-line service on its entire system to ascertain where they may be used to the best advantage. The initial installation will proably be distributed mostly on southern branches of the road.

The details of construction of these cars conform in general to those of the standard gas-electric motor cars manufactured by the General Electric Company. These cars measure over 71 feet over bumpers, weigh approximately 51.5 tons and seat 86 passengers each. They are equipped with two type GE-205, 600-volt, box-frame, oil-lubricated, commutating-pole railway motors having a total of 200 horsepower capacity. The motors are

mounted with nose suspension directly on the axles of the forward truck. The generating unit consists of an eight-cylinder, four-cycle gas engine of the "V" type, direct-connected to a 600-volt, commutating-pole, direct-current generator designed to meet the special conditions the service demands.

The interior of the cars is partitioned into five compartments. The cab in front contains the power plant and control apparatus; next is the baggage room, then the colored-passenger compartment, the smoking section, and the main passenger compartment.

All of the body of the cars is of steel construction, except the seats and interior finish, which are of mahogany. A center vestibule with side entrances is between the smoking and colored-passenger compartments. A rear platform entrance is also provided. The bearings and treads and flanges of the wheels conform to MCB standards. The trucks are of the heavy swinging bolster type with elliptic bolster and coil equalizer springs.



Rear, Side and Front Elevations and Plan of Gas-Electric Motor Car.

Shipment of Generators for Ford Power Plant.

The first car containing generator parts for the mammoth direct-current power plant that Henry Ford is erecting in Detroit, left Ampere, N. J., recently. It will require about 15 cars to transport all the material which comprise these four big units, each one having a normal capacity of 3,750 kilowatts and weighing 105 tons.

Fig. 1 shows a field frame of one of these machines, with coils assembled. This is 21 feet high and 26 feet wide across the supporting feet. Fig. 2 shows one-half of one of these frames being hauled in city streets.

The armature is approximately 16 feet in diameter and weighs about 87,000 pounds. As these dimensions exceed the limits set by railroads for clearances on tracks, bridges and tunnels, the assembly of the armature and winding will be done in Detroit.

These four generators were designed and built by the Crocker-Wheeler Company.

Electric Cooking Equipment.

The dining room of the directors of the Midland Railway at the station at Derby, England, has been fitted up with an electric cooking installation. An Eclipse hot cupboard and carving table, a bain marie, grill and toaster, and a number of kettles, etc., form the equipment. The hot cupboard and carving table measures 60 inches by 33 inches by 30 inches deep; it has two shelves and two sliding doors, and the top plate is ground bright and arranged for electric heating. There are six switches and terminals for connection to the 350-volt three-phase supply. The bain marie is of copper, 24 inches by 18 inches by 5 inches water depth and 9.5 inches overall depth. It has an inside perforated plate for supporting various utensils. It has three switches mounted along the side and suitable terminals are arranged for connection to the 350-volt circuit. For both the cupboard and the bain marie the pressure between each phase and the neutral is 200 volts.

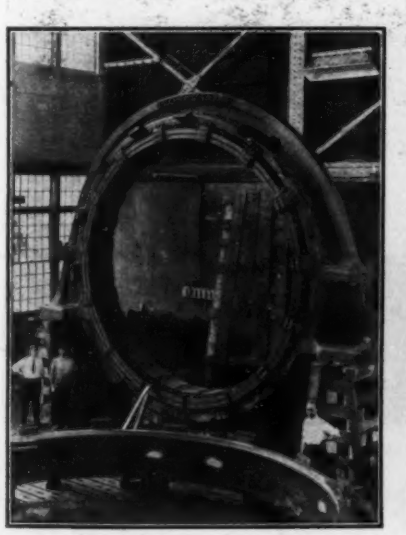


Fig. 1.—Field Frame for Large Dynamo.

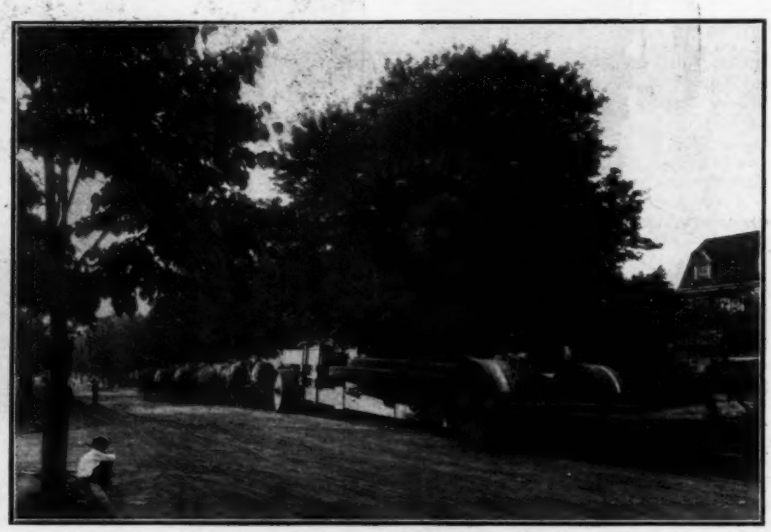
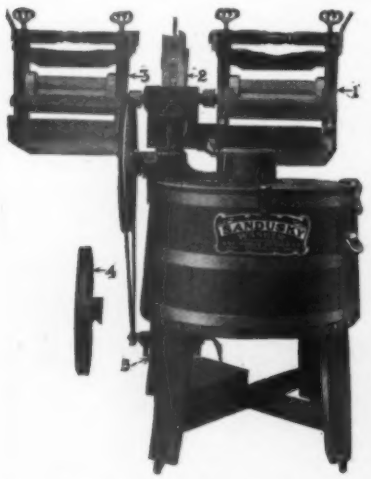


Fig. 2.—Method of Hauling Generator Parts.

Sandusky Electric Washer.

A new electric washer with unique wringing features has been placed on the market. It is equipped with a device by which the wringer can be started, stopped, reversed or swung to any desired position. While the washer is in operation the wringer can wring from the rinsing water to the bluing tub or from the latter to the basket. In the accompanying illustration, position *1* shows the wringer in position to wring clothes from the washer to the rinsing tub. Position *2* shows the wringer swung so as to handle clothes from the rinsing tub to the bluing tub. Position *3* shows the wringer swung around so as to wring from the bluing tub to the basket.

The tub is made from Virginia cedar and is finished in natural color with one coat of shellac and two coats of varnish. The staves are held together by three 15-inch galvanized-steel hoops. The legs are of hard wood and are bolted to the chime. The water



Electric Washer, Showing Three Wringer Positions.

can be drained from the bottom, so it is not necessary to tilt the tub. The castings are made of gray iron and steel, finished in enamel and gold bronze. All gears are covered and a safety-release device is provided.

Each washer is equipped with a ⅛-horsepower motor made by the Robbins & Myers Company, Springfield, O. The washer is manufactured by the One Minute Washer Company, Sandusky, O.

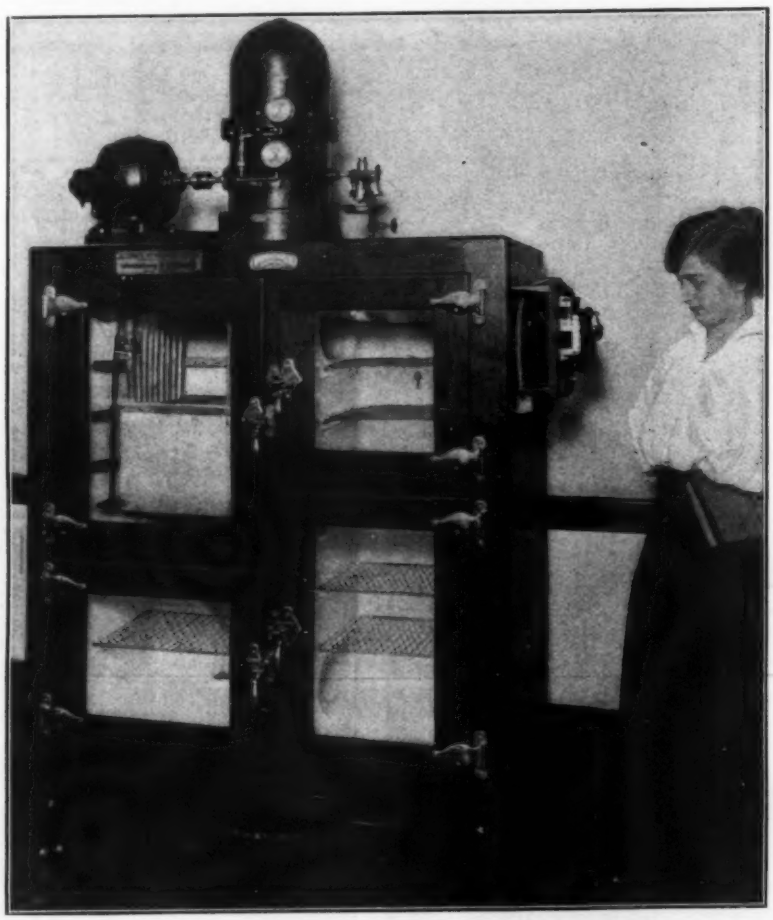
Power-Factor of Induction Motors.

A reader has called attention to a sentence in an article entitled "Compensated Type of Polyphase Motor," published on page 341 of the issue of August 15, which states, with reference to the secondary windings of the rotor: "These windings are said to react upon the stator in such a way as to increase the power-factor of the motor."

It is thought that this statement may be misleading, and we wish to call our readers' attention, in this connection, to the fact that the power-factor of a polyphase induction motor is independent, for a given torque, of the resistance of the secondary circuit. It is determined by the magnetic leakage and other properties of the magnetic circuits of the motor.

New Domestic Electric Refrigerator Proves Efficient.

One of the most remarkable demonstrations at the recent Electrical Exposition in Grand Central Palace, New York City, was that of electric refrigeration in the exhibit of Westerberg & Williams, where under actual test a new type of household refrigerating plant manufactured 100 pounds of ice on 2.5 kilowatt-hours of energy. With a power rate of ten cents per kilowatt-hour the cost of operation may be compared with ice on the basis of 25 cents per 100 pounds. This is a record of economy in electrical ice-making for domestic purposes.



Electrically Operated Household-Type Refrigerator.

The machine was seen by the public for the first time at the Electrical Exposition. It is the result of a number of years of experimenting by the firm's engineers and has not yet been placed on the market, although it will probably be at an early date. Westerberg & Williams plan to manufacture the machine in two sizes, one for apartments and small houses, with a capacity of 150 pounds of ice per day, and one of 300 pounds capacity suited for large private residences. The equipment is planned to fulfill the exacting requirement of household refrigeration service where no trained labor is available for looking after the machine. It is planned to make the initial cost so low that it will be within the reach of the average householder.

The exhibit was a center of interest during the exposition, the plant running continuously, maintaining a temperature of from 28 to 33 degrees and simultaneously making 12 pounds of ice in four-pound blocks. The operation of the machine is entirely automatic, the starting and stopping taking place in response to the temperature in the refrigerator. It is equipped with a one-quarter-horsepower motor.

Current Electrical News

NORTH ATLANTIC STATES.

MORRISVILLE, VT.—This town is soon to improve its street-lighting system. Present arc lamps will be replaced by Type C Mazdas on the business streets, and by smaller Mazda units on the residence streets.

CHICOPEE, MASS.—The board of aldermen has reported favorably upon the petition of the Amherst Power Company to erect a 13,000-volt transmission line to Ludlow.

FALL RIVER, MASS.—The board of aldermen has decided to install new lighting systems on Pleasant Street and South Main Street.

LUDLOW, MASS.—The Amherst Power Company, Amherst, Mass., has bought the business of the Ludlow Manufacturing Company in supplying electricity in this town, and after January 1 the Central Massachusetts Electric Company, of Palmer, Mass., will take over the business of supplying street lighting in Wilbraham, now furnished by the Ludlow Manufacturing Company. The latter company is a subsidiary of the Ludlow Manufacturing Associates, operating a large industrial plant at Ludlow. W.

SPRINGFIELD, MASS.—A new street-lighting system is being installed for the business portion of the city. Arc lights will be increased from 182 to 402, while improvements in the general lighting of the city contemplate an increase in lighting units equivalent to about 25 per cent.

WEST GARDNER, MASS.—Ornamental electric lighting standards are to be erected in the business district for an improved lighting system, the installation being made and supplied with energy by the Gardner Electric Light Company. The local gas company advocated gas lighting and installed two lamps as a sample installation, the electric company making a like installation of electric lamps for comparison.

WORCESTER, MASS.—Extensions are to be made to the lighting systems on Belmont Street and Summer Street.

FAIR HAVEN, CONN.—Electric lights are to be installed on North Quinnipiac Avenue.

BATH, N. Y.—The Public Service Commission has approved the application of the Board of Trustees for a franchise to operate a municipal light and power plant. Bonds to the amount of $50,000 will be issued.

MAYVILLE, N. Y.—A vote has been carried to issue bonds to the amount of $9,700 for the purpose of equipping the village power plant, electric current to be secured from the Chautauqua Traction Company.

SOUTH ATLANTIC STATES.

LOGAN, W. VA.—The Logan Light and Power Company, which was recently incorporated by Philadelphia capitalists with a capital stock of $1,500,000, is contemplating the construction of a large plant to develop electricity by water-power, for the purpose of serving the numerous mining plants in this section. W. C. Lawrence, of Logan, is among those interested. L.

HOMESTEAD, FLA. — Homestead Light, Ice & Power Company will establish $12,000 electric light and ice plant. Address J. U. Free, manager.

LAKELAND, FLA.—Bonds to the amount of $130,000 have been voted for enlarging the light and water plants and extending lines.

NORTH CENTRAL STATES.

HAMDEN, O.—The town is considering making a contract with a newly organized electric company, the Hamden Light and Garage Company, to supply it with current, on account of the fact that the Hocking Valley Company has notified it that after January 1 it will no longer furnish current. The local company will be organized shortly with a capital stock of $15,000, and plans to construct a small plant ample for the needs of the town and other consumers in that vicinity. A garage will be operated in connection, using up-to-date electrical equipment. L.

NOKOMIS, ILL.—A bond issue of $25,000, with which to build and equip a municipal electric light plant, has been favorably voted upon. Z.

WEYAUWEGA, WIS.—The electric light plant, including water power rights, has been purchased by F. H. Joselyn and LeRoy Harron, of Oshkosh.

AURORA, MINN.—The city council has decided to construct a new power plant to cost about $27,000, of which $17,000 is to be used for equipment.

LAKE WILSON, MINN.—It has been voted to grant a 10-year franchise for the installation of an electric light system. Plans are being discussed for a line from Pipestone to Hatfield, Trosky, Edgerton and Jasper.

ROCHESTER, MINN.—The council has directed the Pillsbury Engineering Company, to prepare estimates for new electric plant. Address L. A. Orr, president of utility board.

ST. PAUL, MINN.—The city purchasing agent has been authorized to advertise for bids for a city lighting system. One is for equipment and current and the other for current only.

KELLOGG, IA.—The Kellogg Electric Company has been granted a franchise to construct, maintain and operate an electric lighting system for a period not exceeding 25 years.

THOR, IA.—A company is being organized to install an electric light plant. Address G. E. Nurby.

TROY MILLS, IA.—A company has been incorporated with a capital of $40,000, to develop water power and to install an electric lighting plant for surrounding towns. Address W. R. Furman, president, or W. F. Stauffer, secretary.

HECLA, S. DAK.—The board of trustees has decided to build an electric light plant. Address Andrew Armour, clerk.

DEWITT, NEBR.—The council will purchase the electric light plant owned by a private company. Improvements will be needed. Address Village Clerk.

LEAVENWORTH, KANS. — The advantage of white ways has appealed to still another group of merchants in Leavenworth, and those on Fifth Street, from Choctaw to Shawnee, are now asking for poles and lights.

SOUTH CENTRAL STATES.

BEATTYVILLE, KY.—The Beattyville Utilities Company has been organized with a capital of $10,000, to install an electric light plant. Address E. Bearce Bullock, Jr., care John D. Wakefield & Company, 118 South Fifth Street, Louisville, who has charge of purchasing equipment.

IRVINE, KY.—C. R. Flynn has purchased the franchise offered by this town for the operation of an electric light plant. He is said to represent Ohio interests, who will establish a plant at once.

MIDDLESBORO, KY.—The Low Ash Mining Company has announced that it will electrify its equipment, and will use motor-driven cutting and haulage machinery.

MUNFORDVILLE, KY. — The Munfordville, Ky., Electric Light and Power Company has given formal notice of dissolution, having been succeeded by the New Munfordville Electric Light and Power Company. Grant Vanfleet is secretary of the old corporation. G.

NEW HAVEN, KY.—The town will vote on a bond issue November 3 for the purpose of providing funds for the establishment of an electric light plant. The proposed bond issue will amount to $4,500. Ivo A. Howard is chairman of the board of trustees.

PEBBLE, KY.—The city has voted to construct an electric light plant. Address Mayor.

STITHTON, KY.—George Greenup and L. J. Metcalfe are buying equipment for an electric light plant.

JASPER, TENN.—The Dunwoody Flour Mill will install motors for the operation of its special equipment, current from the Tennessee Light and Power Company now being available at that point.

BUNKIE, LA.—The Bunkie Ice Company is completing plans for taking over the franchise now owned by W. D. Haas. The company plans to install a new and up-to-date plant and furnish the town with a 24-hour service. W. L. Thomp-

son, of Boyce, La., has been employed as supervising engineer and specifications have already been submitted to the promotors.

WEST MONROE, LA.—The town, through its mayor, N. G. Tippit, is now advertising for bids for furnishing the equipment and the construction of an electric light plant and for enlarging the water works plant as per plans and specifications on file in the mayor's office. Bids will be opened November 14. Address Mayor Tippit.

ARDMORE, OKLA.—The five-year lighting contract made between the city commissioners and the Ardmore Ice, Light & Power Company has been approved.

WESTERN STATES.

MULLAN, IDA.—The Thompson Falls Power Company has applied for a right-of-way for transmission lines from the power plant at the Falls to this city. The mining camps and ranches enroute will be served with current for light and power. O.

ST. ANTHONY, IDA.—Application of the Mesa Power Company of St. Anthony, Idaho, for permit to erect a water power plant at Big Falls in the North Fork of the Snake River in Idaho, and a transmission line to convey power to points north of that place, has been received in the engineering department of the Ogden district forestry service. The plant will have 6,000 horsepower, and with the transmission line when complete will represent an expenditure of approximately $1,000,000 according to Forest Engineer J. P. Martin.

GOLDFIELD, NEV.—F. B. Mechling, district superintendent of the Nevada-California Power Company, recently signed contracts for the construction of a new power line between Tonopah and Belmont. This work will cover about 14.3 miles. Charles Wyckoff is the contractor.

DOUGLAS, ARIZ.—The city council has ordered an immediate survey of the city in order to establish grades for street paving and the installation of an ornamental lighting system.

EDISON, WASH.—A subsidiary of the Stone & Webster Management Corporation, with head offices in Seattle, Wash., will immediately begin electrifying the towns of Edison and Blanchard, and has announced its intention of locating its substation in Edison. Power lines will also be extended along the Skagit Valley, supplying light and power to ranches along the line. Address the Stone & Webster Management Corporation, Seattle, for information. O.

LEWIS, WASH.—A private electric plant is to be installed in this city by A. Snyder, who, it is reported, is in the market for motors and other electrical equipment. O.

SEATTLE, WASH.—The City Utilities Committee of the city council has recommended to the council that work be ordered on the improvement of Columbia, Marion and Madison Street, from First to Railroad Avenue, by the installation of a cluster lighting system. The cost of this work will be assessed to the abutting property, and it is understood bids for materials and installation of same will be received by the Board of Public Works within 30 days.

PORTLAND, ORE.—The following special appropriations were made by the City Commission for the installation of lighting systems in city parks: Laurelhurst, $8,000; Kenilworth Park, $1,500; Holliday Park, $1,140. It is reported bids for materials and installation will be received within 60 days. O.

PASADENA, CAL.—A proposition is under consideration for joining Pasadena and South Pasadena by an ornamental lighted way along South Fair Oaks Avenue from Oneonta Park to Green Street. This will involve important changes in plans already made for an ornamental lighting system on that avenue from Dayton Street to California in Pasadena. South Pasadena is planning to install ornamental posts on both sides of South Fair Oaks Avenue from Columbia Street to Huntington Drive.

WOODLAND, CAL.—Deeds to 18 rights of way near Merritt Island, below Clarksburg, have just been filed by the Great Western Power Company, which will include Yolo County in its territory.

PROPOSALS.

DISTRIBUTION TRANSFORMERS.—The Board of Public Works, Seattle, Wash., A. L. Valentine, chairman, will receive bids until November 13 for supplying a year's requirement of distribution transformers for the city lighting department. The amount required will approximate an expenditure of about $40,000. O.

ELECTRIC DISTRIBUTION SYSTEM.—Sealed proposals will be received until November 18, for furnishing all material and labor for construction of a complete electric and water works system and plans as follows: One electric pole-line distributing system; one electric and pumping plant with two 100-horsepower boilers, feed water pump and heater, steam engines, alternating-current generator and switchboard; two pumps and all auxiliaries and accessories, as per plans and specifications. Address H. S. Jaudon Engineering Company, Box 582, Savannah, Ga.

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained by writing (mentioning file number) to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or to the nearest of its branches at Boston, New York, Atlanta, Chicago, New Orleans, Seattle and San Francisco.]

NO. 14,051. TELEPHONES, ETC.—An American consular officer in a southern European country advises that the chief of the government supply department of posts and telegraphs wishes to secure as soon as possible catalogs and price lists of telegraph, telephone and post-office equipment and supplies. Catalogs, etc., should also be sent to the consular officer.

NO. 14,077. ELECTRICAL SUPPLIES, ETC.—A dealer in electrical supplies, mirrors and cut glass advises an American consul in Europe that he desires to buy from American manufacturers. Correspondence may be in English.

NO. 14,082. ELECTRICAL SUPPLIES.—An American consular officer in southern Europe reports that a dealer in electric lamps, wire, bells, alarms, and other electrical supplies desires to receive catalogs from American manufacturers. Correspondence and catalogs should be in French or Spanish.

NO. 14,107. MOTORCYCLE MAGNETOS.—A firm in Great Britain advises an American consular office that it is anxious to get in touch with an American manufacturer making a small, cheap, motorcycle magnets.

NO. 14,116. ELECTRIC - LIGHT SUPPLIES, ETC.—An American consul in Europe advises that a firm in his district desires to be brought into touch with American exporters of electric-light supplies, hardware, utensils, tools, novelties, rubber goods, pneumatic tires, and similar merchandise. Correspondence should be conducted in Spanish. Prospective exporters should quote prices c. i. f. destination in all possible instances. The firm solicits catalogs.

NO. 14,117. ELECTRICAL MACHINERY AND SUPPLIES.—A firm of electrical engineers, dealing in electrical supplies and electrical machinery of various kinds in a city in southern Europe, has requested an American consular officer to supply addresses of American manufacturers in these lines. Illustrated catalog, price lists, and conditions of sales are desired. The firm is particularly interested in electrical machinery, turbines, electrolytic copper, telephones, and electric supplies generally. Correspondence should be in Spanish. Prices should be c. i. f. destination.

NO. 14,129. ELECTRICAL SUPPLIES.—An American consular officer in the United Kingdom reports that a large firm of whoesale importers of electrical supplies is desirous of communicating with American manufacturers, with the object of purchasing this line of goods, particularly pocket lamps, opal shades, and any new staple heating and cooking appliances. The firm states that it desires calls from American traveling salesmen visiting that country.

NO. 14,149. COMPRESSED EBONITE.—The Bureau of Foreign and Domestic Commerce is in receipt of a telegram from an American consular officer in the United Kingdom stating that a company in his district requires considerable quantities of compressed ebonite for high-tension insulation for magnetos for internal-combustion engines.

NEW PUBLICATIONS.

PASADENA LIGHTING REPORT.—The Municipal Lighting Works Department of Pasadena, Cal., has issued its Seventh annual report. This gives a financial statement for the year 1913-1914, a statement of new customers obtained, and illustrations of the street-lighting installation. It has been prepared by C. W. Koiner, general manager.

"AMERICAN ELECTROMAGNETIC TELEGRAPH."—An interesting publciation, entitled "American Electromagnetic Telegraph," has been arranged dealing with the early history of the electromagnetic telegraph from letters and journals of Alfred Vail by his son J. Cummings Vail. This document has been published by Hine Brothers, 100 William Street, New York, to whom requests for copies should be made.

NEW INCORPORATIONS.

EVANSVILLE, IND.—The Seiffert Electric Company has increased its capital stock from $10,000 to $20,000.

HEALDTON, OKLA.—The Colonial Public Service Company has been incorporated with a capital of $6,000 by J. W. Jennings.

RICHMOND, IND.—Richmond Electric Company, to manufacture electrical supplies. Capital $10,000. Directors: W.

M. Bailey, C. T. Wiley, E. M. Anderson and others.

RICHMOND, IND.—Richmond Electric Company. Capital, $10,000; W. M. Bailey, C. T. Wiley, E. M. Anderson and others.

EDGERTON, MO.—McCosmas Hydro-Electric Light Company. Capital, $50,000; plans to construct dam across Platte River near Edgerton.

SEATTLE, WASH.—Summit Lake Power Company has been incorporated with a capital stock of $4,000,000 by Joseph K. Dorr and E. P. Mullen.

POMONA, CAL.—The Truitt Electric Co. has been incorporated with a capital stock of $25,000, by F. L. Somers, E. Hinman, C. Truitt et al.

INDIANAPOLIS, IND.—Electric Metals Company. Capital $10,000. Directors: H. H. Buckman, Jr., George A. Pritchard and Mildred R. Buckman.

AKRON, O.—The R. L. Johnson Electric Company has been incorporated, capitalized at $10,000, by R. L. Johnson, Winifred Johnson, C. L. Dinsmore and J. A. H. Myers.

UNION CITY, IND.—The Imperial Electrical Company, to manufacture electrical devices. Capital $10,000. Directors: Ray H. Garver, Richard H. Garver, W. S. Buchanan and others.

BIRMINGHAM, ALA.—Lanier-White Electric Company. Capital stock $5,000; paid in $3,000. Officers: J. D. Lanier, president; D. B. White, vice-president; J. W. Lanier, secretary and treasurer.

LAKETON, IND.—The Akron & Laketon Utility Company has been organized with a capital of $25,000 to supply electricity to cities and towns. Incorporators are W. K. Stevenson and others.

NEW YORK, N. Y.—Goodchild Electrical Company, Incorporated. Capital $30,000. Incorporators: Walter Goodchild, 199 Washington Street, New York City, John D. Caplinger, Newark, N. J.; K. M. Caplinger, Montclair, N. J.

TRENTON, N. J.—B. & K. Specialty Manufacturing Company has been incorporated to manufacture electrical and porcelain goods. Capital $50,000. The company is located at 31 East State Street. Incorporators: Lester W. King, Solomon Berman and U. G. King, all of Trenton.

NEW YORK, N. Y.—Isgold Manufacturing Company, Inc., to manufacture electric fixtures and appliances. Capital $6,300. Incorporators: Isidor Goldberg, 23 Bay View Avenue, New York; Mortimer J. Vogel, Southfield Boulevard Great Kills, N. Y.; Arthur Zadek, 1186 Madison Avenue, New York City.

ALBANY, N. Y.—The Ciego De Avila Water Supply & Electric Corporation. To develop water and electric power in Cuba and elsewhere. Capital $3,000,000. Incorporators: Manuel P. Cadenas, Camaguey, Cuba; Frank R. Greene, 27 Grace Court, Brooklyn, N. Y., and William J. Doyle, 133 Lefferts Avenue, Brooklyn, N. Y.

ALBANY, N. Y.—Mount Whitney Power and Electric Corporation, to acquire the stock of the Mount Whitney Power and Electric Company, a California corporation. Capital $1,712,500. Incorporators: Harris Hammond, 903 Park Ave., New York City; R. D. Hanna, 3485 Broadway, New York City; T. T. Trapnell, 1339 University Avenue, New York City.

NEW YORK, N. Y.—Users of Electricity Protective League, to sell electrical appliances and combine users of electricity for mutual protection. Capital $10,000. Incorporators: Hyman Fish, 156 Fifth Avenue, New York City; Harry Sanderson, 41 West Sixty-fourth Street, New York City; William Pfeiffer, 544 West One Hundred and Forty-Fifth Street, New York City.

FINANCIAL NOTES.

George D. Milne has been elected a director of the New England Telephone Company, in place of Charles H. Wilson, resigned.

At the annual meeting of the Coney Island & Brooklyn Railway Company, a subsidiary of the Brooklyn Rapid Transit, the board of directors was increased from nine to thirteen by addition of the following: Colonel T. S. Williams, J. H. Bennington, George D. Youmans and William Seibert. Other directors were re-elected.

Dividends.

	Term.	Rate	Payable
American Railways, pf.	Q	1.75%	Nov. 14
Conn. Ry. & Ltg., com.	Q	1 %	Nov. 14
Conn. Ry. & Ltg., pf.	Q	1 %	Nov. 14
Colum. Ry., Pr. & Lt., pf.	Q	1.25%	Nov. 2
Colum. Ry., Pr. & Lt., com.	Q	1.25%	Nov. 2
Grand Rapids Ry., pf.	Q	1.25%	Nov. 2
Ill. & Pr. Sec., pf.	Q	1.75%	Nov. 16
Kaministiquia Pr.	—	1.5 %	Nov. 16
Kellogg Switchboard	Q	3 %	Oct. 31
Ohio Traction, pf.	Q	1.25%	Nov. 2
Pacific Pr. & Lt., pf.	Q	1.75%	Nov. 1
South. Cal. Edi., com.	Q	$1.50	Nov. 15

Reports of Earnings.

KINGS COUNTY ELECTRIC LIGHT & POWER.

The report of the Kings County Electric Light & Power Company and the Edison Electric Illuminating Company of Brooklyn for the nine months ended September 30, 1914, compares as follows:

	1914	1913
Gross operating revenue	$4,550,391	$4,078,972
Net after taxes	1,446,369	1,506,629
Other income	48,728	48,554
Total income	1,495,098	1,555,184
Surplus after charges	850,159	894,679

EARNINGS OF BYLLESBY PROPERTIES.

Combined earnings of gas and electric properties operated by H. M. Byllesby & Company, including Standard Gas & Electric Company, Consumers Power Company of Minnesota, Louisville Gas & Electric and Western States Gas & Electric show:

	1914	1913
September gross	$1,120,034	$1,092,822
Net after taxes	530,052	489,191
Nine months' gross	10,520,016	10,339,573
Net after taxes	4,829,199	4,576,692

LEHIGH VALLEY TRANSIT.

	1914	1913
September gross	$ 173,648	$1,164,620
Net	90,479	83,853
Surplus after charges	32,562	36,627
Twelve months' gross	1,863,249	1,739,738
Net	964,388	876,503
Surplus after charges	274,657	328,864

SOUTHWESTERN POWER & LIGHT.

	1914	1913
September gross	$ 245,921	$ 194,461
Expenses and taxes	123,295	103,520
Net earnings	122,626	90,941
Twelve months' gross	2,703,529	2,158,599
Expenses and taxes	1,479,935	1,182,583
Net earnings	1,223,594	976,016

CITIES SERVICE.

	1914	1913
September gross	$ 279,416	$ 147,696
Net after expenses	268,835	138,528
Balance after interest	228,002	122,914
Balance after preferred dividends	91,169	59,362
Twelve months' gross	3,803,196	1,591,064
Net after expenses	3,701,772	1,508,552
Balance after interest	3,330,110	1,459,652
*Balance after preferred dividends	1,761,411	735,183

*Equivalent to 11.55 per cent on common stock.

TEXAS POWER & LIGHT.

	1914	1913
September gross	$ 146,086	$ 103,129
Net after taxes	60,246	39,405
Surplus after charges	42,406	20,179
Twelve months' gross	1,533,196	1,113,459
Net after taxes	534,277	430,325
Surplus after charges	285,798	252,287
Balance after preferred dividends	132,610	142,737

FORT WORTH POWER & LIGHT.

	1914	1913
September gross	$ 76,537	$ 58,486
Net after taxes	41,067	33,412
Surplus after charges	31,287	25,999
Twelve months' gross	859,555	612,547
Net after taxes	460,657	352,396
Surplus after charges	360,592	275,021
Balance after preferred dividends	293,859	231,835

SOUTHERN CALIFORNIA EDISON.

	1914	1913
September, gross	$ 411,997	$ 419,950
Net earnings	226,132	208,278
Total income	229,517	209,005
Surplus after charges	149,675	134,129
Balance after depreciation	74,675	69,129
Nine months' gross	3,557,171	3,525,020
Net earnings	1,811,463	1,760,964
Total income	1,855,774	1,770,919
Surplus after charges	1,165,838	1,141,935
Balance after depreciation	690,838	636,935

PERSONAL MENTION.

MR. THEODORE N. VAIL, president of the American Telephone & Telegraph Company, will return shortly to New York from an extended vacation at Old Point Comfort, Va. Mr. Vail states that his health has never been better.

W. K. TUOHEY, of Springfield, Mass., president of the Electrical Contractors' Association of Massachusetts, addressed the convention of the Rhode Island Association October 20, on "The Contractor's Troubles and the Remedy." Mr. Tuohey is a prominent electrical contractor in his city.

GEORGE W. LEE, librarian of the Stone & Webster Engineering Corporation, Boston, Mass., and once president of the Field and Forest Club, entertained a gathering of that organization October 20, by recounting his experiences in Europe and in escaping from the war zone this fall.

MR. JAMES CLARK, JR., president of the James Clark, Jr., Electric Company, of Louisville, Ky., read a paper before the Universal Craftman Council of Engineers in Louisville last week on the subject, "Electricity." The occasion was an open meeting at which discussion of boilers, heating appliances, elevators and other equipment was on the program.

MR. GEORGE S. RICE has been appointed by the Public Service Commission of the First District, New York, engineer of the sixth division, which includes the two new East River tunnels. Mr. Rice was the chief engineer of the old Rapid Transit Commission, and up to two years ago was the chief engineer of the present commission.

MR. JAMES P. SPRUNT, the popular detail and supply salesman of the Salt Lake City office of the Westinghouse Electric & Manufacturing Co., has been discharged from St. Marks Hospital where has was sent as a result of injuries incurred in a railroad accident in the Logan yards of the Oregon Short Line Railroad Company. Mr. Ralph Dinwoodey of the Inter-Mountain Electric Company was also on the train but suffered no damage aside from a severe shaking up.

MR. GEORGE M. DUNKLE, for-

merly sales manager of the Gary Heat, Light and Water Company, Gary, Ind., has established at 14 Scarritt Arcade, Kansas City, Mo., the offices of the George M. Dunkle Company, which is Missouri and Kansas agent for the Eden washer and will also handle the motors and appliances of the Wisconsin Electric Company, of Racine, Wis. Mr. Stuart Harrington of considerable acquaintance in Kansas City, has been engaged as city salesman.

MR. HUBERT S. WYNKOOP, electrical engineer in charge of the division of electrical inspection of the City of New York, is being endorsed by many friends in the electrical fraternity and particularly among the inspection department of New York City, for appointment to the office of chief engineer in the Department of Water Supply, Gas & Electricity, vice Mr. Charles F. Lacombe, who has recently resigned. Mr. Wynkoop was appointed to his first official position in May 1894, as Inspector of Gas and Electricity in the old City of Brooklyn, having been at the head of the eligible list for that position. In January 1908, upon the consolidation of the old City of Brooklyn and other outlying sections with the old City of New York, he was placed in charge of the newly organized Bureau of Gas and Electricity in the Borough of Brooklyn, and a few years later his title was changed to electrical engineer as the result of a competitive Civil Service examination. In October 1908, when the Bureau of Gas and Electricity was reorganized, he was brought to the headquarters office of the Bureau in the Borough of Manhattan and placed in charge of the five borough offices of the Division of Electrical Inspection in recognition of his many years of service and his general fitness for the place. He is a Fellow in the American Institute of Electrical Engineers, and a member of the American Society of Mechanical Engineers, Municipal Engineers and Brooklyn Engineers' Club. He is also a member of the Electrical Committee of the National Fire Protection Association, which makes the National Electrical Code, and vice-president of the National Association of Electrical Inspectors. He served for many years in the National Guard of the State of New York, attaining the rank of major, and his military training has particularly adapted him to the efficient direction of the work and the forces of men under him in the various official positions he has held.

MR. H. C. EVANS was tendered a complimentary dinner at the Bellevue-Stratford Hotel, Philadelphia, on Friday evening, October 16, commemorating his

H. C. Evans.

thirtieth year with the Lorain Steel Company. "The Major" as he is familiarly and affectionately known, really finishes his 30 years with the company on October 31. The fact, however, that the sales managers of the company and many other members of the sales department were attending the convention of the American Electric Railway Association at Atlantic City, made the time and place propitious. Mr. Evans began attending the conventions of the American Electric Railway Association in St. Louis in 1885, and he has not missed once since that time, making the Atlantic City meeting his twenty-ninth consecutive convention. He is the only person attending the conventions today with such a record. The dinner, which was given in the Green Room of the Bellevue-Stratford Hotel, was attended among others by Daniel Coolidge, president, and P. M. Boyd, secretary of the company; A. L. Verner, H. L. Gleeson, S. J. Cotsworth, Carroll Burton, E. B. Entwisle, A. S. Littlefield, S. P. McGough, W. W. Kingston, John A. Stacey, E. N. Noonan, of the Lorain Steel Company, and E. P. Thomas, president of the United States Steel Products Company, and W. B. Gresham, his assistant.

DATES AHEAD.

National Association of Railway Commissioners. Annual meeting, Washington, D. C., November 17. Secretary, W. H. Connolly, Washington, D. C.

American Society of Refrigerating Engineers. Annual meeting, New York City, November 30-December 1. Secretary, W. H. Ross, New York, N. Y.

American Society of Mechanical Engineers, New York, N. Y., December 1-4. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York, N. Y.

American Mining Congress. Seventeenth annual session, Phoenix, Ariz., December 7-11. Secretary, J. F. Callbreath, Denver, Colo.

American Association for the Advancement of Science. Annual meeting, Philadelphia, Pa., December 28, 1914, to January 2, 1915. Secretary, L. O. Howard, Washington, D. C.

Western Association of Electrical Inspectors. Annual meeting, Minneapolis, Minn., January 26-28, 1915. Secretary, W. S. Boyd, Chicago, Ill.

With the Electrical Manufacturers

The Arrow Electric Company, Hartford, Conn., has ready for distribution a supplement to its catalog No. 16. This brings the latter publication up to date by listing the many additions to the "Arrow E" line made during the year. Changes in list prices are also given. The supplement is well illustrated and covers 24 pages.

Page & Hill Company, Minneapolis, Minn., is distributing some interesting information respecting its process of butt-treating cedar poles. The company announces that only preservatives of the highest character are used and the quality is guaranteed by strict specifications.

Wheeler Reflector Company, 156 Pearl Street, Boston, Mass., is sending out a supplement to its Bulletin R. This covers porcelain-enameled reflectors for gas-filled multiple tungsten lamps. A dozen different types are illustrated and over 30 are listed. These range from the 200 to the 1,000-watt sizes.

The Youngstown Sheet & Tube Company, Youngstown O., of which **The Western Conduit Company** is a subsidiary, on October 23, distributed $200,000 among its employees in accordance with its profit-sharing policy. All employees participated. The payment represents three per cent of the aggregate payroll for the past fiscal year.

The Delta-Star Electric Company, 617 West Jackson Boulevard, Chicago, Ill., is distributing a special bulletin, No. 14, containing extracts from a paper read before the Indiana Electric Light Association. This paper gives considerable data respecting methods of installing outdoor sub-stations, their cost, operation, etc. Copies will be forwarded to those interested upon request.

The Menominee Electric Manufacturing Company, Menominee, Mich., has just issued catalog No. 25 describing its complete line of intercommunicating telephones and apartment house equipments; also a motor bulletin describing its complete line of single-phase, multi-phase, direct-current and universal motors up to and including one horsepower. Copies will be sent to interested parties upon request.

Steel City Electric Company, 1207-19 Columbus Avenue, Pittsburgh, Pa., has ready a number of new bulletins, of which No. 22 deals with universal insulator supports; these are malleable-iron clamps for securing insulators to open steel framework. Bulletin No. 23 is devoted to Fullman adjustable floor outlets, and bulletin No. 24 to

non-adjustable outlets of the same type. These are all water-tight.

The Electric Storage Battery Company, Philadelphia, Pa., announces that the Saxon Motor Company of Detroit, Mich., has adopted the Exide battery as its standard for use with electric starters to be furnished with the Saxon Model "A" roadster as extra equipment. This Exide battery is known as type 3-XC-13-1, and will be used for starting, lighting and ignition. It has a capacity at the 20-minute rate of 93 amperes, is 9¼ inches long, 7 13/32 inches wide, 9⅛ inches high and weighs less than 46 pounds.

Wirt Company, Germantown, Philadelphia, Pa., has ready for distribution a new catalog of Dimalites. These well known turn-down attachments for dimming incandescent lamps have been added to recently by the development of the socket-type Dimalite. This and the older types are illustrated and described. The company states that over 25 per cent of its factory output is exported, shipments being made to nearly every country that uses electricity for domestic lighting. Two special types are made for the export trade, one with the British or bayonet cap and the other with the Continental Edison screw base.

Record of Electrical Patents.

Issued by the United States Patent Office, October 20, 1914.

1,113,955. Electric Incubator. F. A. Carey, Missoula, Mont. Has thermostatically controlled heater circuits.

1,113,974. Cable-Reel for Haulage Mechanism. D. T. Fisher, assignor, to Jeffrey Mfg. Co., Columbus, O. The armature of the driving motor is on a concentric shaft and drives the reel through reduction gearing.

1,113,975. Cable-Winding Mechanism for Locomotives. D. T. Fisher, assignor to Jeffrey Mfg. Co. The motor drives the reel through bevel gearing.

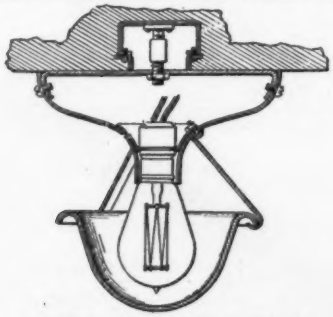
1,113,986. Wire-Stripper. T. L. Gregson and J. I. Payette, Chicago, Ill. Wire-stripping knives are pivoted on the pliers.

1,114,003. Magneto. E. J. Kane, Chicago, Ill. Inductor type.

1,114,007. Electrical Signaling System. E. Kleinschmidt, New York, N. Y., assignor to Hall Switch & Signal Co. Block-signal system with ironless track transformers.

1,114,015. Diffuser for Electric Fans. G. H. Moll, St. Louis, Mo. A frontal extension of the guard supports a secondary or distributing fan.

1,114,048. Calling Device. H. O. Rugh, assignor to Hall Switch & Signal Co. An impulse circuit-controlling device for dispatching system.



1,114,111.—Semi-Indirect Fixture.

1,114,049. Signaling System. H. O. Rugh, assignor to Hall Switch & Signal Co. Electric train-dispatching system.

1,114,069. Self-Starter. G. F. Trotter, Des Moines, Iowa, assignor of one-half to A. M. Millard. Of the motor-dynamo type.

1,114,071. Magnetic Separator. G. Ullrich, assignor to E. Krupp, Aktiengesellschaft, Grusonwerk, Germany. Has magnetic field subdivided into partial fields.

1,114,078. Train Signaling and Controlling System. J. F. Webb, Jr., assignor to Electric Signagraph & Semaphore Co., New York, N. Y. Electric semaphore-operating and signaling system.

1,114,089. Electric Light Adjusting Socket. D. Yamada, Santa Ana, Cal. Includes a rotatable dimming coil with sectionalized resistance.

1,114,096. Miner's Blasting Box. J. Beeneck, Nanticoke, Pa. Includes a battery, a circuit-closer, and means for operating same through a lock.

1,114,110. Electric-Lamp Bracket. J. Chassaing, assignor to Shiras Electric Co., St. Louis, Mo. Portable and adjustable bracket with U-shaped hanging clip.

1,114,111. Lighting Fixture. J. Chassaing, assignor to Shiras Electric Co. Semi-indirect fixture consisting of reflecting canopy from which is hung a diffusing globe. (See cut.)

1,114,116. Photographic-Printing Apparatus. H. C. Coffman and B. F. Van Horne, Gary, Ind. Includes incandescent lamps and control therefor.

1,114,118. Railway-Traffic-Controlling System. C. J. Coleman, assignor to Hall Switch & Signal Co. Electric step-by-step control for home and distant semaphores.

1,114,130. Trolley Hanger. J. T. Gary, Atlanta, Ga. Has two arms for grasping a suspension wire and special means for clamping the cap and body parts.

1,114,149. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Covers special details.

1,114,157. Spark Plug. G. A. Long, Hartford, Conn. The stem rotates and thereby closes the ignition contacts.

1,114,174. Controlling Apparatus for Telephone Switching Systems. E. C. Molina, assignor to American Telephone & Telegraph Co. Automatic line switches pick out idle operators' circuits.

1,114,180. Elevator. C. O. Pearson, New York, N. Y. Automatic means for shutting off power and applying brake to electric elevator when hoisting rope breaks.

1,114,207. Electric Cigar-Lighter. H. G. Weeks, assignor to New Era Mfg. Co., Chicago, Ill. Contains electric heating unit.

1,114,219. Spark Plug. H. H. Young, Loudonville, O. Rotatable electrodes.

1,114,225. Interrupting Device. C. N. Cahusac, assignor to Western Electric Co. Oscillating circuit-interrupter.

1,114,275. Annunciator. A. Lungen, assignor to Edwards & Co., New York, N. Y. Covers details of electromagnetic operating mechanism.

1,114,283. Trolley. J. M. Olinger, Springfield, O. Has pivoted supporting arm.

1,114,299. Electric-Light Fixture. L. Severus, Chicago, Ill. Includes candelabra-type lamp, elongated socket and candle-like surrounding tube and holder.

1,114,340. Non-Renewable Fuse. R. C. Cole, assignor to Johns-Pratt Co., Hartford, Conn. Cartridge fuse with hardened-steel parts permanently attached to and protecting the casing ends to render these difficult to perforate. (See cut.)

1,114,361. Electric Dynamo. W. K. Howe, assignor to General Railway Signal Co., Gates, N. Y. A slotted magnetic ring surrounds the armature.

1,114,366. Wire Terminal. G. C. Knauff, Chicago, Ill. Connector terminals with split plug and receiving socket, both protected by sleeves.

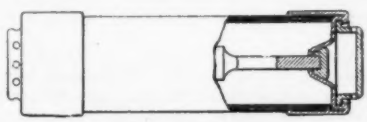
1,114,379. Party-Line Exchange. N. E. Norstrom, assignor to Anderson Electric & Mfg. Co., McPherson, Kans. Has an electromagnetically actuated ratchet operating a telephone signal.

1,114,380. Trolley-Base. W. J. Paul, assignor to Couch & Paul Trolley Base Co., Boston, Mass. Covers details of construction.

1,114,404. Electric Heater and Humidifier. W. C. Smith, Twin Falls, Idaho, assignor of one-half to H. A. Brizee. Contains heating elements and a water jacket.

1,114,405. Dynamo-Electric Machine Provided with Commutating Pole-Pieces. C. H. Smoot, assignor to Rateau-Battu-Smoot Co., New York, N. Y. Commutating poles are mounted so as to have an adjustable air gap between these poles and the yoke.

1,114,408. Correcting Disturbances on Telephone and other like Wires. J. B. Speed, New York, N. Y. Consists in producing an oscillogram of the disturbance on the line and in producing synthetically and regulating another disturbance to nullify the effect.



1,114,340.—Non-Renewable Fuse.

1,114,409. Apparatus for Correcting Disturbances on Telephone and other like Wires. J. B. Speed. Amplification of the above.

1,114,413. Electric Sad Iron. E. E. Taeubert, Los Angeles, Cal. Resistance ribbon is mounted edgewise on an insulating sheet.

1,114,419. Hydraulic Turbine. W. M. White, Milwaukee, Wis. An electric generator forms the upper part of the machine.

1,114,427. Automatic Railway-Signaling System. C. L. Bopp, Hawkeye, Iowa. Has step-by-step indicators in-

terposed in the line wire and means for causing current to flow therein to operate the indicators as a train passes.

1,114,428. Automatic Railway-Signal and Relay Therefore. C. L. Bopp. Covers details of mechanism.

1,114,429. Automatic Railway-Signaling Device. C. L. Bopp. An indicator with an endless web moving over drums.

1,114,430. Induction Automatic Stop and Cab-Signal System. C. L. Bopp. Includes a variable high-potential source connected across the air gap.

1,114,431. Pneumatically Timed Air Valve. C. L. Bopp. Has solenoid-operated puppet valve.

1,114,432. Automatic Signaling Device. C. L. Bopp. A cab signal with a pivoted magnetic needle and contacts carried thereby adapted to close signal circuit.

1,114,433. Automatic Train-Stop and Cab-Signal. C. L. Bopp. Includes electromagnetic means for operating air valve.

1,114,434. Automatic Speed Control for Railway-Trains. C. L. Bopp. Electrically operated.

1,114,457. Automatic Winder for Spring-Motors. F. J. C. Frederick, Jersey City, N. J. Electric motor winds spring of phonograph.

1,114,459. Electric-Fan Screen and Guard. B. F. Fritts, Chattanooga, Tenn. Fan blades are inclosed in cylindrical screen.

1,114,477. Railway Signal. R. F. Hudson, assignor to Gravity Railway Signal Co., Richmond, Va. Electric control for a lock in a block-signal system.

1,114,481. Wheel Mount. A. Johnson, Quincy, Ill. Special trolley harp.

1,114,515. Electric-Current Shunt. W. H. Pratt, assignor to General Electric Co. Instrument shunt with special terminals.

1,114,516. Electrical Measuring Instrument. D. R. Price, assignor to General Electric Co. Has two electrostatically movable elements.

1,114,517. Indicator. J. B. Purvis, Detroit, Mich. Electric lamp signal to indicate the position of the link motion of an engine.

1,114,528. Casing for Alarm Devices. G. I. Rockwood, Worcester, Mass. Electrical alarm for water-pipe system.

1,114,534. Excitation of Dynamo-Electric Commutator Machines. A. Scherbius, assignor to General Electric Co. A polyphase commutator exciter with compound fields connected to the polyphase commutator machine that it excites.

1,114,548. Transformer. G. Stern, assignor to General Electric Co. Polyphase oil transformer with special submerged taps and plug-switch means for connecting them.

1,114,558. Protective Device. E. B. Wedmore, assignor to General Electric Co. Inverse-time-limit overload relay.

1,114,565. Electric Burglar-Alarm System. J. P. Williams, New York, N. Y., assignor to Electric Bank Protection Co. Tampering with a vault lock actuates the alarm.

1,114,578. Stock-Quotation Indicator. R. W. Bumstead, Boston, Mass. Electrical selective indicating system.

1,114,597. Signaling System. F. A. Emery and A. A. Adams, assignors to Atlantic National Bank, Providence, R. I. Electromagnetic means for moving a range indicator one step at a time.

1,114,612. Electrical Recorder. A. S. Hibbard, New York, N. Y. Comprises a transmitter with a series of fixed terminals and a brush for successively contacting therewith and actuating a corresponding receiver.

1,114,616. Wire-Drawing Appliance. H. F. Humphrey, Joliet, Ill. Has solenoid-controlled clutch for rotating the wire-drawing block.

1,114,626. Series-Multiple Switch and Condenser for Wireless-Telegraph Systems. T. B. Miller, assignor of one-half to Smith Cannery Machines Co., Seattle, Wash. The switch controls the capacity of the condenser.

1,114,628. Electrically Operated Lock. J. C. Mosley, St. Louis, Mo. Coin-controlled.

1,114,630. Electropneumatic Train Control. M. V. Murphy and E. Baker, Baltimore, Md. Electrically controlled valve.

1,114,633. Typewriting Machine. W. J. Neidig, assignor to Neidig Typewriter Co., Chicago, Ill. Has electrical indicators to show when the paper reaches certain positions.

1,114,635. Method for Cleaning Metals. A. A. Nelson, assignor to Acme Steel Goods Co., Chicago, Ill. Electrolytic process.

1,114,636. Indicator or Detector for Lubricating Systems. A. Nelson, Iowa City, Iowa. A float closes an alarm circuit when the oil level falls too low.

1,114,637. Cable Grip. H. Nolan, Brooklyn, N. Y. Comprises three grips formed of wire strands woven into spiral form and formed at one end into a single eye.

1,114,640. Air-Propulsion Device. T. O'Brien, Brooklyn, N. Y. Has electric heating elements.

1,114,642 and 1,114,643. Apparatus for Electrically Controlling Air-Brakes. E. L. Orcutt, deceased; F. A. Maddox, Medford, Mass., and E. N. Hutchins, Somerville, Mass., executors. Electrically controlled exhaust port.

1,114,644. Speed-Regulating Mechanism. E. L. Orcutt, deceased; F. A. Maddox and E. N. Hutchins, executors. Has means for opening the circuit of the electric valve when the train is moving at a predetermined speed.

1,114,654. Fuse Cartridge. J. W. Steelman, Philadelphia, Pa. Has conical wedge caps in the ends of the tubular casing.

1,114,665. Manufacture of Electrical Conductors. T. B. Allen and L. B. Coulter, assignors to Carborundum Co., Niagara Falls, N. Y. One step consists in impregnating silicon carbide with a colloidal solution of graphite.

1,114,667. Process of Making Electrodes for Secondary Batteries. J. Apoznanski, assignor to Stanislaw & Georgij Gaszynski Bros., Apoznanski & Co., Moscow, Russia. Consists in very rapidly drying the paste filled in the grids and impeding the exit of the gases within the grids during the drying.

1,114,680. Electric Switch. H. W. Denhard, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Rotary switch with spring-pressed stepped cam surface.

1,114,682. Electric Switch. F. L. Eager, Waterbury, Conn. For branching trolley wires.

1,114,684. Semaphore Arm. J. W. Fenton, assignor to S. F. Spencer, Dresden, O. Includes an incandescent lamp, a lens and reflectors for illuminating the entire length of the arm.

1,114,697. Electron-Discharge Apparatus. A. W. Hull, assignor to General Electric Co. Comprises an evacuated tube, an electron-emitting cathode, an anode and magnetic means for confining the discharge from the cathode into a restricted beam.

Patents Expired.

The following United States electrical patents expired October 26, 1914.

592,244. Electrical Power Transmission. T. J. Fay, Brooklyn, N. Y.

592,245. Electric Hair-Drier. H. Futter, Dusseldorf, Germany.

592,249. Face Plate for Flush Switches. G. W. Hart, Hartford, Conn.

592,259. Electrical Equipment for Vehicles. S. H. Short, Cleveland, O.

592,269. Electric Vibrating Bell. H. F. Albright, Elizabeth, N. J.

592,301 to 592,415 (inclusive). Multiple Switchboard. M. G. Kellogg, Chicago, Ill.

592,416. Spring-Jack for Telephone Switchboards. M. G. Kellogg.

592,417 to 592,425 (inclusive). Multiple Switchboard. M. G. Kellogg.

592,427. Cutout for Electric Signal Boxes. L. W. Miller, Rochester, N. Y.

592,431. Telephone-Switchboard Apparatus. F. R. McBerty Downer's Grove, Ill.

592,432. Cutoff Relay for Telephone-Switchboards. F. R. McBerty.

592,441. Electric Cable. W. R. Patterson, Chicago, Ill.

592,443. Automatic Electric Circuit-Breaker and Closer. E. Pruckner and G. Schindler, Newark, N. J.

592,452. Pilot Lamp for Telephone Switchboards. C. E. Scribner, Chicago, Ill.

592,463. Electrical Resistance Device. E. E. Anthony, Detroit, Mich.

592,494. Telegraph Transmitter for Ocean Cables. D. Lynch, New York, N. Y.

592,497. Contact in Shunt for Circuit-Breakers. W. M. Scott, Philadelphia, Pa.

592,503. Automatic Electric Alarm Device. P. V. Vandevelde, Corona, N. Y.

592,505. Electrical Insulator. W. Barbour, Bar Harbor, Me.

592,524. Supply System for Electric Railways. A. Megroz, Buda-Pesth, Austria-Hungary.

592,528. Electric Railway. E. A. Crocker, Bridgeport, Conn.

592,541. Elevator Safety Device. A. H. Ernst, Chicago, Ill.

592,551. Incandescent Electric Light Support. R. L. Mahon, Duluth, Minn.

592,565. Joint for Third Rails for Electric Railways. P. Haley, and P. P. Thompson, Chicago, Ill.

592,596. Contact Device for Electric Railways. E. R. Pommer, New York, N. Y.

592,600. Thermometric Electrical Circuit-Closer. G. H. Zeal, London, England.

592,619. Electric-Motor Regulator. F. V. Vilaret and D. Belais, New York, N. Y.

592,703. Electric Conductor, G. Gray, Boston, Mass.

592,711. Conduit Railway Trolley. W. Luer, Chicago, Ill.

592,722. Electric Battery. F. M. Bell, New York, N. Y.

592,735. Apparatus for Electrically Treating Liquids. F. Jones, Chicago, Ill.